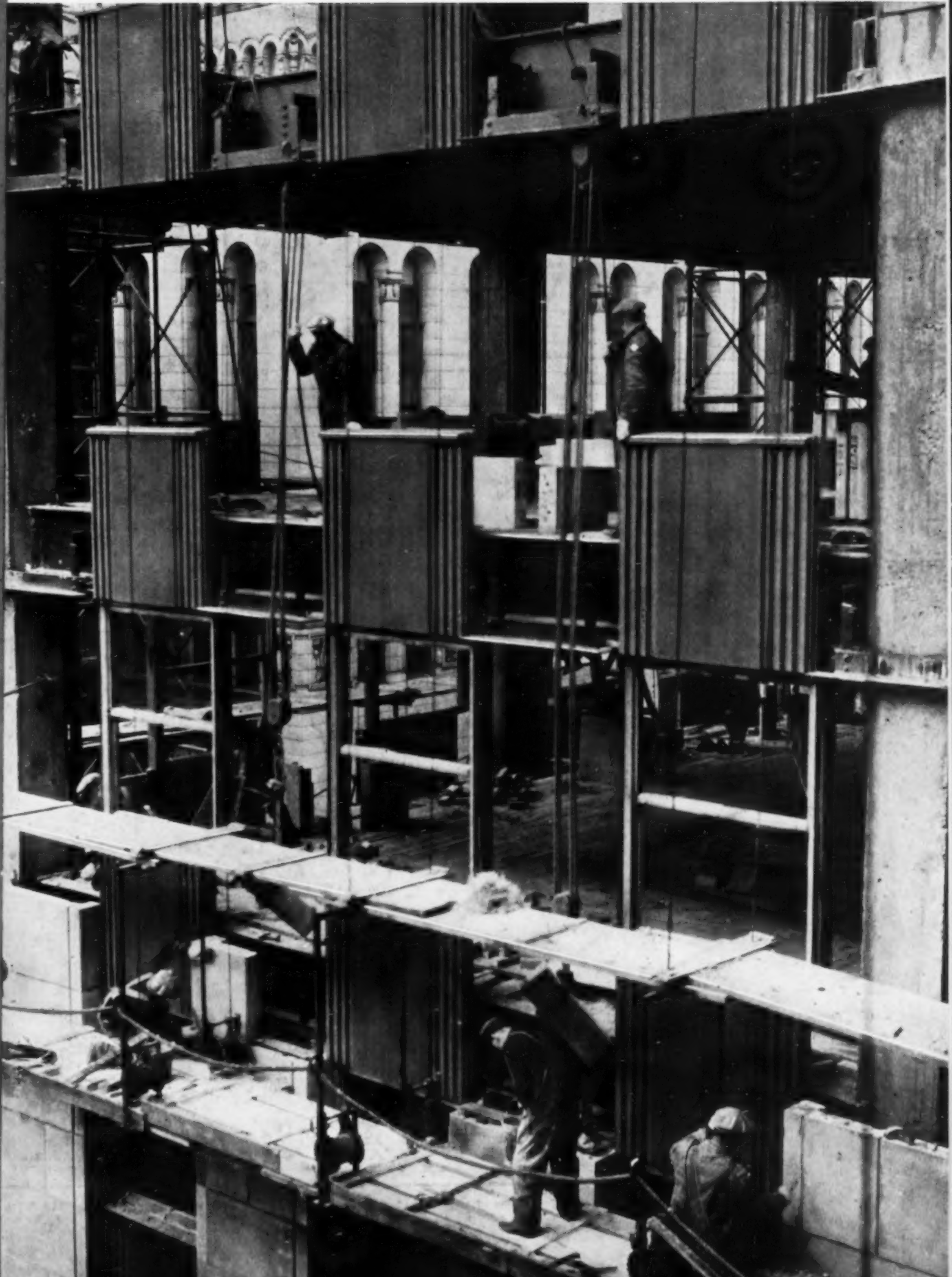
Construction Methods



Stone-Setters Place Limestone Facing Between Cast-Aluminum Spandrels, Field Building, Chicago

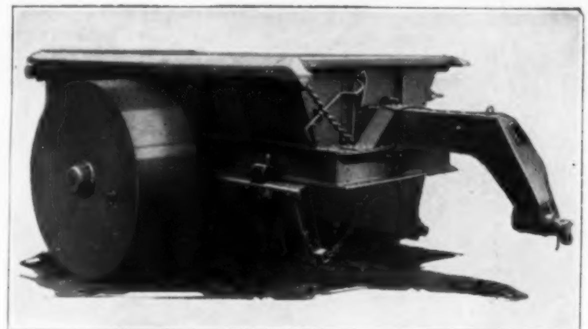
July
1932

McGraw-Hill
Publishing Company, Inc.

MONTHLY REVIEW
F FIELD PRACTICE
AND EQUIPMENT

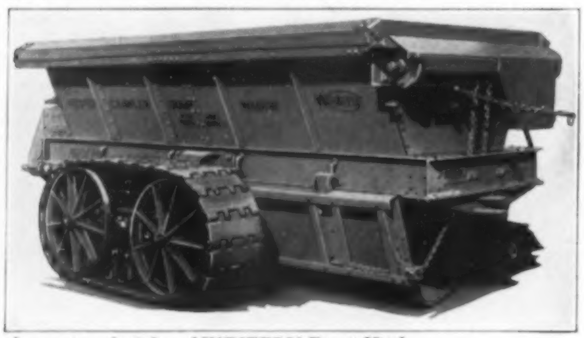
al Construction • Highways
ings • Engineering • Industrial

WESTERN CRAWLER WAGONS



A WESTERN 5 yard Wagon with drum type wheels and spring windup. Note ruggedness of construction!

WESTERN 5 yard Direct Hitch Crawler Wagon, equipped with exclusive WESTERN Spring Windup.



A rear view of a 7-8 yard WESTERN Direct Hitch Crawler Wagon. Also made with removable box top!

A 7 yard model WESTERN Crawler Wagon with front trucks. Of course it's equipped with the exclusive WESTERN Spring Windup.

The 8-10 yard WESTERN Crawler Wagon with front trucks is the largest standard model in the WESTERN Crawler Wagon Line.

feature

STRENGTH AND STURDINESS
THE WESTERN SPRING WINDUP
A SIZE FOR EVERY PURPOSE

WESTERN Crawler Wagons made in 5, 7, 7-10 and 8-10 yard capacities, featuring the exclusive WESTERN Spring Windup, are the answer to your earth moving problems.

Ruggedly built to withstand the stress of fast travel over uneven surfaces, fitted with the exclusive WESTERN Spring Windup that eliminates the dump man and provides for dumping and windup from the tractor operator's seat, and made with large, quick operating bottom doors for instantaneous discharge of the load, the WESTERN Line of crawler wagons is designed for use on every job where large quantities of materials must be quickly and economically moved.

Used with elevating grader or shovel loading, WESTERN Crawler Wagons haul more loads per day quicker, over rougher ground and with less labor, which fact, added to almost complete maintenance elimination, makes them the logical choice for every haulage job. A 5 yard model with 56″x20″ drum type wheels is available for use where haulage conditions are uniformly favorable.

Your nearest AUSTIN-WESTERN representative will be glad to tell you of the new, revised prices and the savings others are effecting with WESTERN Crawler Wagons. Write for copies of Bulletins W-31-H and W-32-B.

The Austin-Western Road Machinery Co., 400 North Michigan Ave., Chicago, Ill.

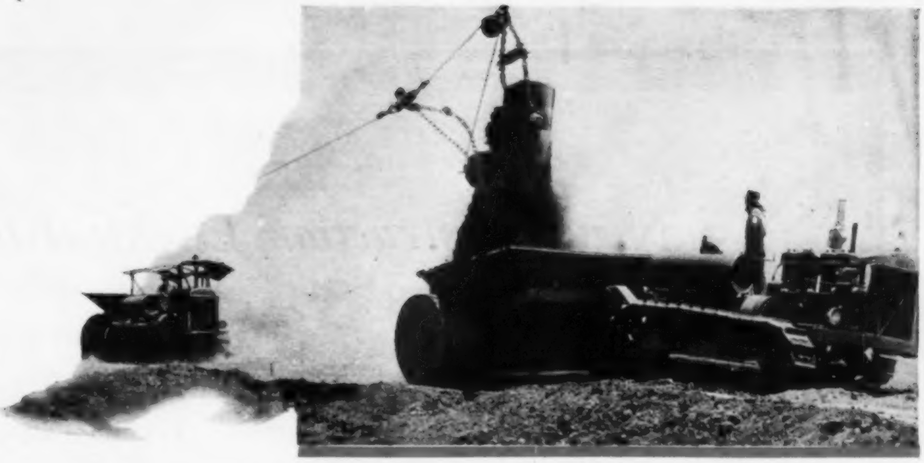
A-340

The Austin-Western ROAD MACHINERY CO.

ROAD ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, SWEEPERS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS. MOTOR GRADERS, PLOWS & SCRAPERS, BITUMINOUS DISTRIBUTORS DRAGS, SHOVELS & CRANES, DUMP WAGONS, SNOW PLOWS.

CONSTRUCTION METHODS, July, 1932. Vol. 14, No. 7. Published monthly. McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York, N. Y. $1 per year. Central and South American countries and Foreign, $2 U. S. Currency, or 10 Shillings. Canada (including Canadian duty), $1.50. 10 cents per copy. Entered as second-class matter, October, 1926 issue, Vol. 8, No. 19, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

The Editor Notes—



The Next Great Construction Era

IN ITS rapid development during the last century the United States has witnessed a succession of great construction eras. Among the first was the period of providing transportation facilities by the building of our transcontinental railway lines. Then came periods of great activity in the construction of public works—waterworks and sewers, irrigation and drainage projects, inland waterways. The growing population in our cities next gave birth to an age of skyscraper construction, while the advent of the automobile has stimulated a nation-wide program of road building and bridge construction.

Out of the present depression, unless all precedent proves unreliable as a guide, will come another great construction era. Like all of its predecessors, it will supply a demand that is urgent and nation-wide. In the belief of many competent observers that demand will take the form of adequate housing, designed to satisfy American standards of living at a cost low enough to be within the reach of the great masses represented by the low-income groups of our population. Here is a vast potential market, not only for the services of the constructor, but also for the materials and the equipment that enter into construction. To open up this market, however, will mean the scrapping of the wasteful, extravagant methods that have prevailed since time immemorial in the field of building construction.

An entirely new conception of the problem and of its solution is needed. An example of the kind of thinking that is going on in the minds of architects, engineers and constructors is offered by the address, reprinted on page 34, delivered by Harvey Wiley Corbett, architect, at the recent Small-House Forum sponsored by the American Institute of Steel Construction. American industry today is confronted with the problem of finding something that can be manufactured on a large scale and that the public will consume—some *new* thing. The solution of that problem, Mr. Corbett predicts, will be found in the adaptation of mass production methods to the building of small houses, in large groups at low cost. The days of the expensive "tailor-made" house are numbered. In its place will come the machine-made house, calling for new methods, new materials or new uses of present products.

The small house of today is largely the product of the local mason and carpenter. The mass-production housing project of tomorrow will open up a new and profitable field of activity for the large contracting organization.

CONSTRUCTION METHODS
A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, *Editor*

Editorial Staff
VINCENT B. SMITH — NELLE FITZGERALD
J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, *Publishing Director*

McGraw-Hill Publishing Company, Inc.
330 West 42d St., New York, N. Y.

Next Month
HOOVER DAM NUMBER

The August issue of *Construction Methods* will be a *Hoover Dam Number,* featuring in text and illustration the progress made by Six Companies Inc. on the $49,000,000 contract for the world's largest dam, being built for the U. S. Bureau of Reclamation in the Black Canyon of the Colorado River, between Nevada and Arizona.

The leading articles will deal with the methods and equipment for driving in rock the four 56-ft. diversion tunnels, large enough to accommodate a 5-story house.

Like the army of Napoleon a construction crew "travels on its belly." How the Hoover Dam workers are being fed will be told in detail.

Problems of planning and organizing the job will be discussed by an executive of the contractor's organization.

Progress on preliminary construction—highways, railways, water supply, the building of Boulder City—will be recorded in a series of striking job photographs, indicating the extreme diversity of operations required before the actual building of the dam could start.

Plan Now for Winter Projects

AT THIS time last year several state highway departments had the foresight to make surveys of their construction needs with a view to providing employment during the winter on projects which could be built in cold weather. These projects usually took the form of grading, drainage, and bridges. Through the cooperation of governors and legislatures funds were provided to carry on much of this desirable construction, thus giving work to many who otherwise would have had to depend upon charity.

It seems probable now that states, counties and municipalities which have not been able to borrow money at reasonable rates of interest from the usual sources will be able to obtain loans for certain types of public works from the Reconstruction Finance Corporation, through the proposed extension of its capital and powers. With funds available at reasonable interest, no unit of our governmental structure ought to delay its normal construction program.

Every effort to hold down unemployment by construction of needed public works will help to relieve this distress and will provide a stimulus to private business. But any program of winter construction, if it is to be effective and economical, must be based on assembled and digested facts. Now is the time for every man in charge of public construction to make a thorough analysis of future needs and to plan profitable winter construction.

Cutting Rock With a Wire Saw

Construction offers a fertile field for the adaptation of methods that have proved successful in other industries. In building the Prettyboy dam for Baltimore's additional water supply the contractor took a leaf from the quarryman's book and used an ingenious type of wire saw for cutting the sides of the cutoff trench. Details on p. 38.

New Construction Essential to Recovery

EVERY day it becomes more evident to open-minded students of business conditions that recovery must depend largely upon the resumption of investment in capital facilities, and that means the resumption of construction activity.

The June issue of the National City Bank Letter, for example, says on this point:

> "Never has there been a clearer demonstration of the part that the accumulation of capital, and its transformation into buildings and machinery and other facilities for raising the standard of life, plays in normal business activity. Every promise of sustained improvement in the industries making goods for personal consumption has failed of realization because supporting improvement in the "capital goods" industries has not occurred.
>
> "Of course, it can be said that the country is over equipped and that capital investment therefore is not needed, but this is only a half-truth, in view of the scrapping that is going on, the mounting obsolescence of the equipment in place, and the new methods, new products and new machinery with which industry needs to equip itself to meet changing markets and to keep production costs down."

In the Harvard Business Review of April, M. C. Rorty, the economist, expresses the same idea:

> "The general conclusion is that any general excess of industrial capacity that existed at the end of 1929 has already been offset by obsolescence. The depressed conditions of the past two years may have prevented the actual writing off of this obsolete equipment but it *is* obsolete and should no longer be assumed to exist as a barrier to the installation of modernized machinery in connection with any upturn in business activity."

Many other business authorities confirm these views. Therein lies the promise of the present efforts to put to work the credits that have been made available by the recent financial legislation and the operations of the Federal Reserve Bank. The need is there, the resources are available; uncertainty as to the future is all that halts for the moment the expansion that is so essential a factor in American prosperity.

Once this distrust has been allayed we shall resume our never-ending task of providing newer buildings, better plant, more efficient industrial and transportation equipment, modern waterworks, safer highways, more sanitary waste-disposal plants — in short, all those diversified facilities that are so vital to the advancing standards of our industry, commerce and community life.

America is still a construction project. The ambition of our people for higher standards of life has not died, their promotive instincts have not gone to seed, their energy and productive capacity have not been destroyed. Restore the faith of the investor in the future of his country, tap the resources now available to provide the structures and equipment we need in order to maintain and increase our efficiency under changed economic conditions, and we may look with confidence for an early return of normal prosperity.

The provision of these facilities is the job of the construction industry and *Construction Methods* rejoices in the awakened appreciation of this fact by those who can help to stimulate a renewed flow of funds into capital investment.

Willard Chevalier

Publishing Director

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

CHICAGO, 520 N. Michigan Ave.

JAMES H. McGRAW, Chairman of the Board
MALCOLM MUIR, President
JAMES H. McGRAW, JR., Vice-Pres. and Treas.
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
H. C. PARMELEE, Vice-Pres. and Editorial Director
HAROLD W. McGRAW, Vice-President
C. H. THOMPSON, Secretary

CABLE ADDRESS: "MCGRAWHILL, N.Y."

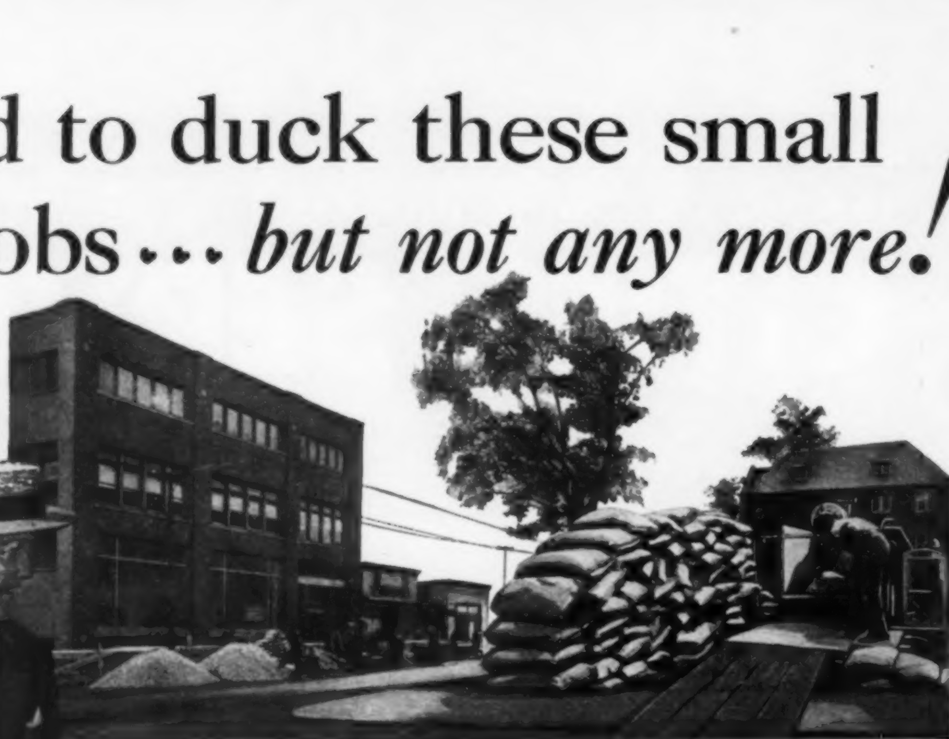
Aldwych House, Aldwych,
LONDON, W.C. 2

Member A.B.P. *Member A.B.C.*

883 Mission St., SAN FRANCISCO

WASHINGTON, National Press Building
PHILADELPHIA, 1600 Arch Street
CLEVELAND, 501 Guardian Building
DETROIT, 2-257 General Motors Building
ST. LOUIS, 1556 Bell Telephone Building
BOSTON, 1427 Statler Building
GREENVILLE, S. C., 1301 Woodside Building
LOS ANGELES, 339-340 Chamber of Commerce Building

"I used to duck these small jobs ... *but not any more!*"



"OF COURSE, I'm not passing up any *big* jobs that come along... but these little repair, maintenance and reconstruction things certainly help to fill in and keep us going.

"The nice thing about today's small jobs is that they are principally *cash* business for both dealer and contractor. Believe me, I can't find any fault with anybody's *cash*. New porches, driveways, remodelling, even sidewalk repairs, find me 'Johnny-on-the-spot'.

"Where this raft of 'small' business calls for *cement, plaster, and so on*, we'd be right up against it, if it weren't for the non-returnable Multi-Wall *Sewn* Paper Bag."

A series of timely bulletins is being mailed to Building Contractors the country over. To insure that yours come to you promptly, send your name and address to The Associated Manufacturers of Multi-Wall Sewn *Paper Bags, 60 East 42nd Street, New York, N. Y.*

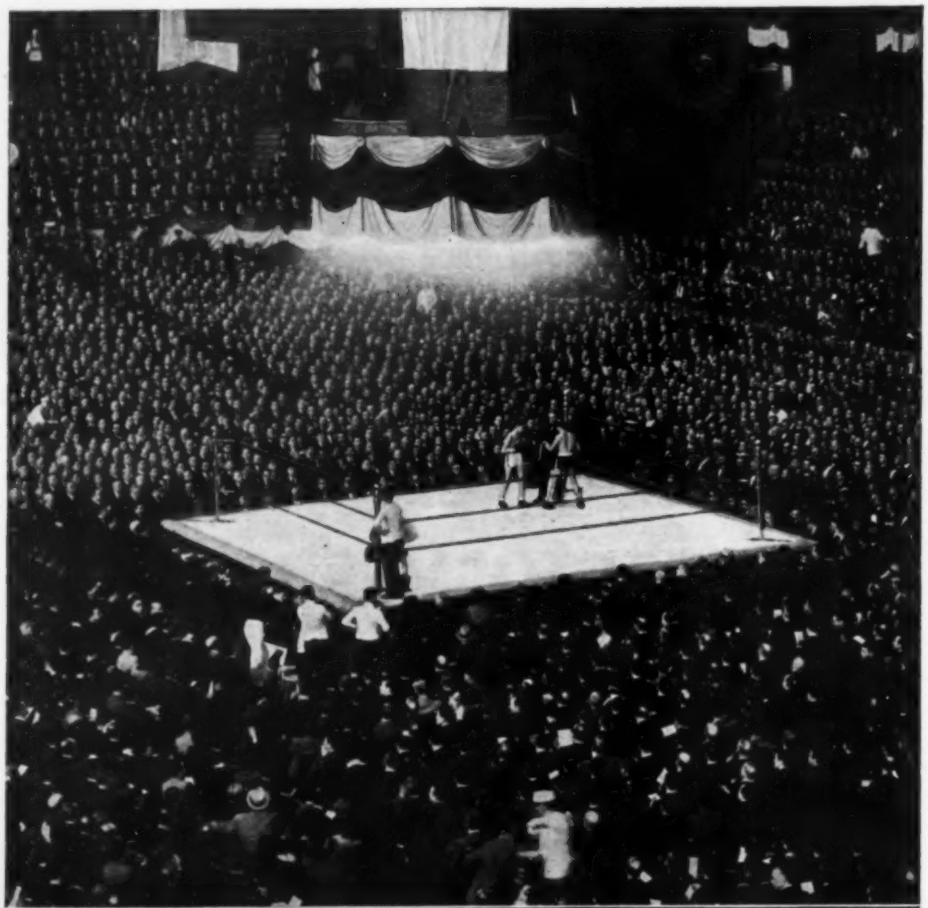
A recent authentic survey conservatively places a round Billion Dollars as the value of the country's 1932 bill for repairs, maintenance, replacements and reconstruction. Desirable on the biggest projects, the Multi-Wall* Sewn *Paper Bag is a necessity in doing this "small" Billion Dollar business.

The Associated Manufacturers of
MULTI-WALL *SEWN* PAPER BAGS
60 East 42nd Street, New York, N.Y.

ARKELL AND SMITHS Canajoharie, N. Y.	THE JAITE COMPANY Jaite, Ohio	TAGGART BROS. CO., INC. 60 E. 42nd St., New York, N. Y.
BATES VALVE BAG CORP. 60 E. 42nd St., New York, N. Y.	THE THOS. PHILLIPS CO. Akron, Ohio	UNIVERSAL PAPER BAG CO. New Hope, Pa.
BEMIS BRO. BAG CO. Peoria, Ill.	THE RAYMOND BAG CO. Middletown, Ohio	THE VALVE BAG CO. 60 E. 42nd St., New York, N. Y.

Another Madison Square Garden

Hockey Rink Frozen 12 Hours After Concrete is Placed



8 P. M. WED.—BOXING MATCH

MADISON SQUARE GARDEN, New York City. Few floors in the world are put to more varied uses. Amazing overnight changes . . . Track meet to circus . . . Horse show to wrestling . . . Tennis to boxing . . . Boxing to hockey!

Boxing gives way to hockey . . . Ringside seats cleared away . . . Floor washed down and flooded . . . Brine, 27° below freezing pumped into 12 miles of pipe, imbedded in the floor . . . Ice frozen for the night's hockey match . . . Hockey over, heated brine at 75° melts the ice . . . In 1½ hours the ice is gone . . . The floor bone dry.

Constant use and quick change damage the Garden's floor. The hockey season is at its height. Smooth, uniform ice freezes only over a perfect surface. The floor must be repaired—quickly. Championship hockey played on time.

Quicker Concrete—Better Concrete

Because of its remarkable economies of time and money, engineers specify 'Incor' 24-Hour Cement. Beginning at midnight workmen dig out the damaged sections. At 8 A. M. 'Incor' is placed. Late that day the floor is flooded—brine pipes turned on. At 8 P. M. ice is frozen over the 12-hour old 'Incor' concrete.

Freezing and thawing are the hardest test of cement durability. And the artificial means used to freeze and thaw in this famous arena are far more severe than the hardest laboratory tests or actual

World's Record Broken in

8 A. M. THURS.—CONCRETE POURED

8 P. M. THURS.—RINK FROZEN

road conditions. The first freeze alone, within twelve hours after placing, equals one or two years in the open, say well-known authorities. The 49 cycles of freezing and thawing, completed within the 5 months of the hockey season, equal 10 years of exposure in highways in northern states.

A spectacular example of 'Incor' performance? Certainly. But not an unusual one. On all types of work where 'Incor' is used, comparable economies in time and money-saving are possible.

Can 'Incor' save money for you? Yes. An 'Incor'* man will gladly call and explain exactly how—give the actual basis for figuring specific jobs. Address the nearest Lone Star Company.

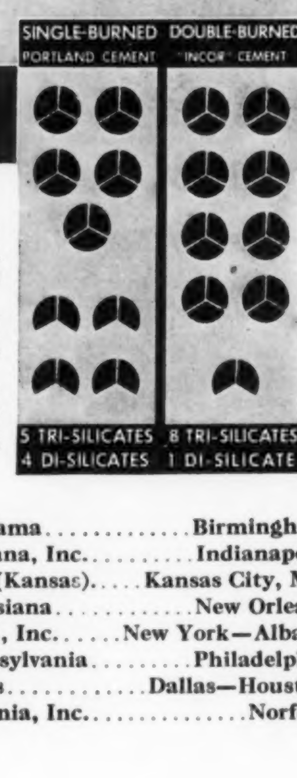
*Reg. U. S. Pat. Off.

HOW 'INCOR' DIFFERS

Diagram at right shows difference between ordinary Portland cement and 'Incor'.

All cements are composed of *tri*-calcium silicates and *di*-calcium silicates. *Tri*-silicates are active. *Di*-silicates, sluggish.

The double-burning process of producing 'Incor' minimizes slow-hardening *di*-silicates, increases active *tri*-silicates. That is why 'Incor' hardens ten times as fast.



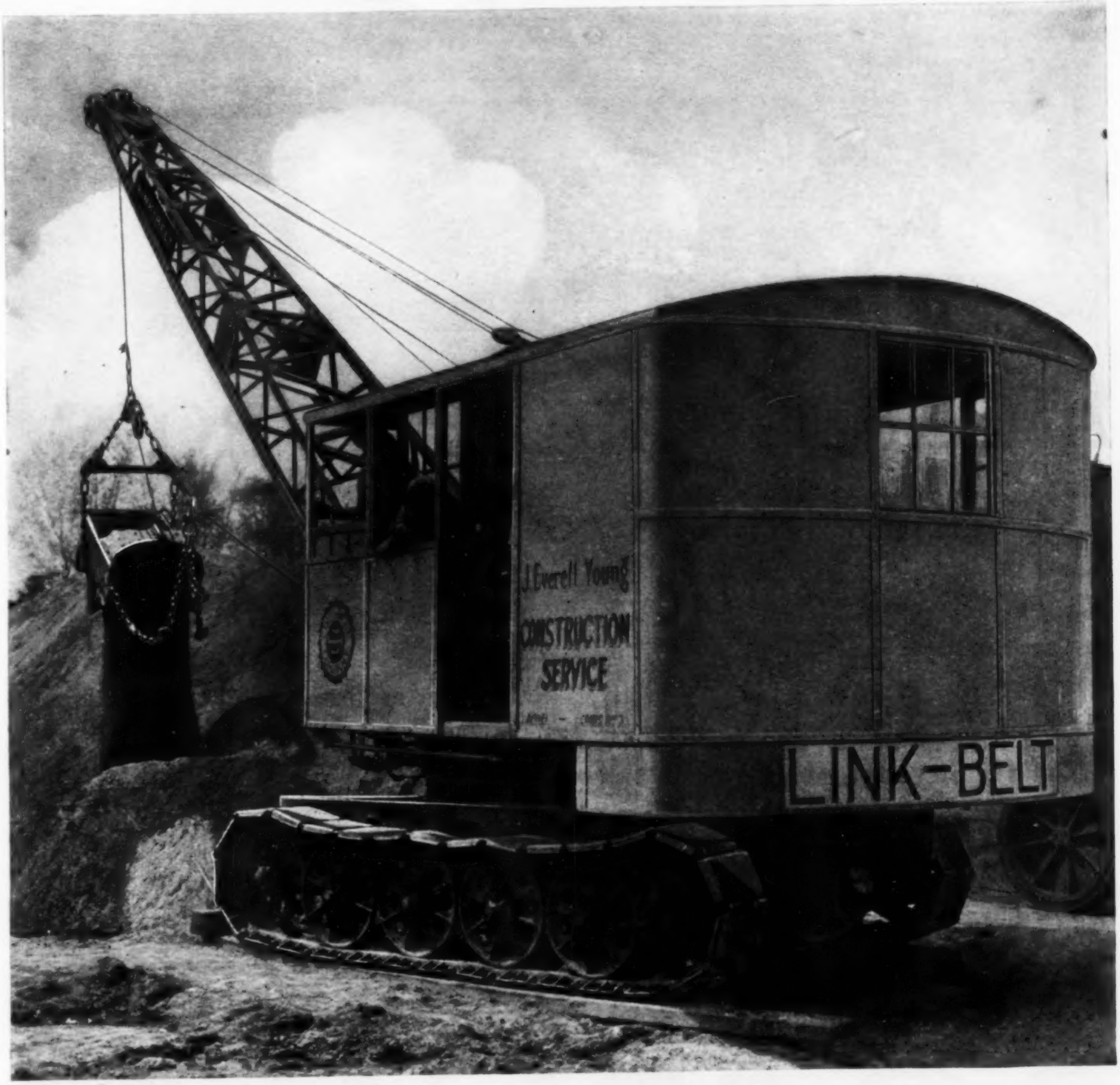
Lone Star Cement Co. Alabama	Birmingham
Lone Star Cement Co. Indiana, Inc.	Indianapolis
The Lone Star Cement Co. (Kansas)	Kansas City, Mo.
Lone Star Cement Co. Louisiana	New Orleans
Lone Star Cement Co. N. Y., Inc.	New York—Albany
Lone Star Cement Co. Pennsylvania	Philadelphia
Lone Star Cement Co. Texas	Dallas—Houston
Lone Star Cement Co. Virginia, Inc.	Norfolk

'INCOR' 24-Hour Cement

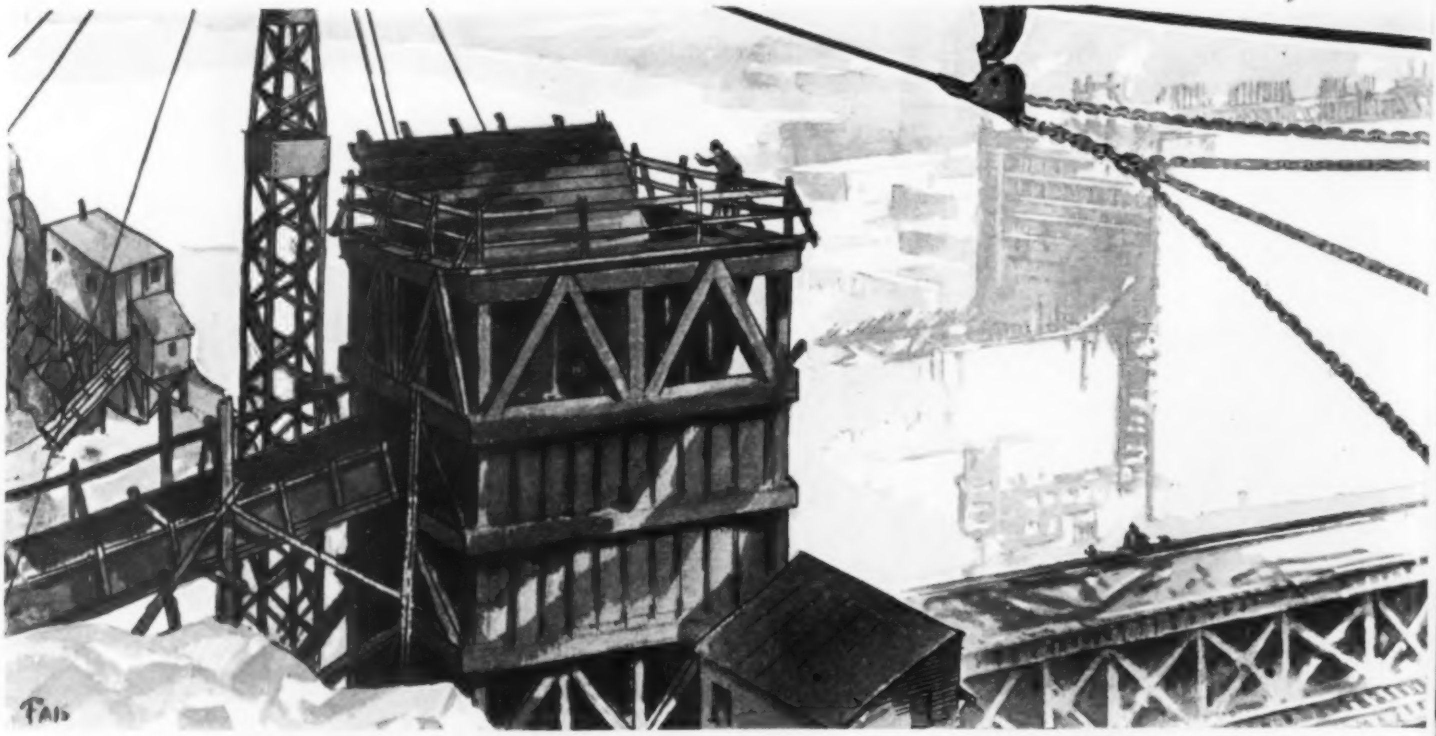
PROVEN BY 5 YEARS' USE

'INCOR' is made by the producers of Lone Star Cement, subsidiaries of International Cement Corporation, under Patent Nos. 1,700,032 & 1,700,033

— still our STANDBY"



SHOVEL / CRANE / DRAGLINE /



A SAFEGUARD FOR ROPE

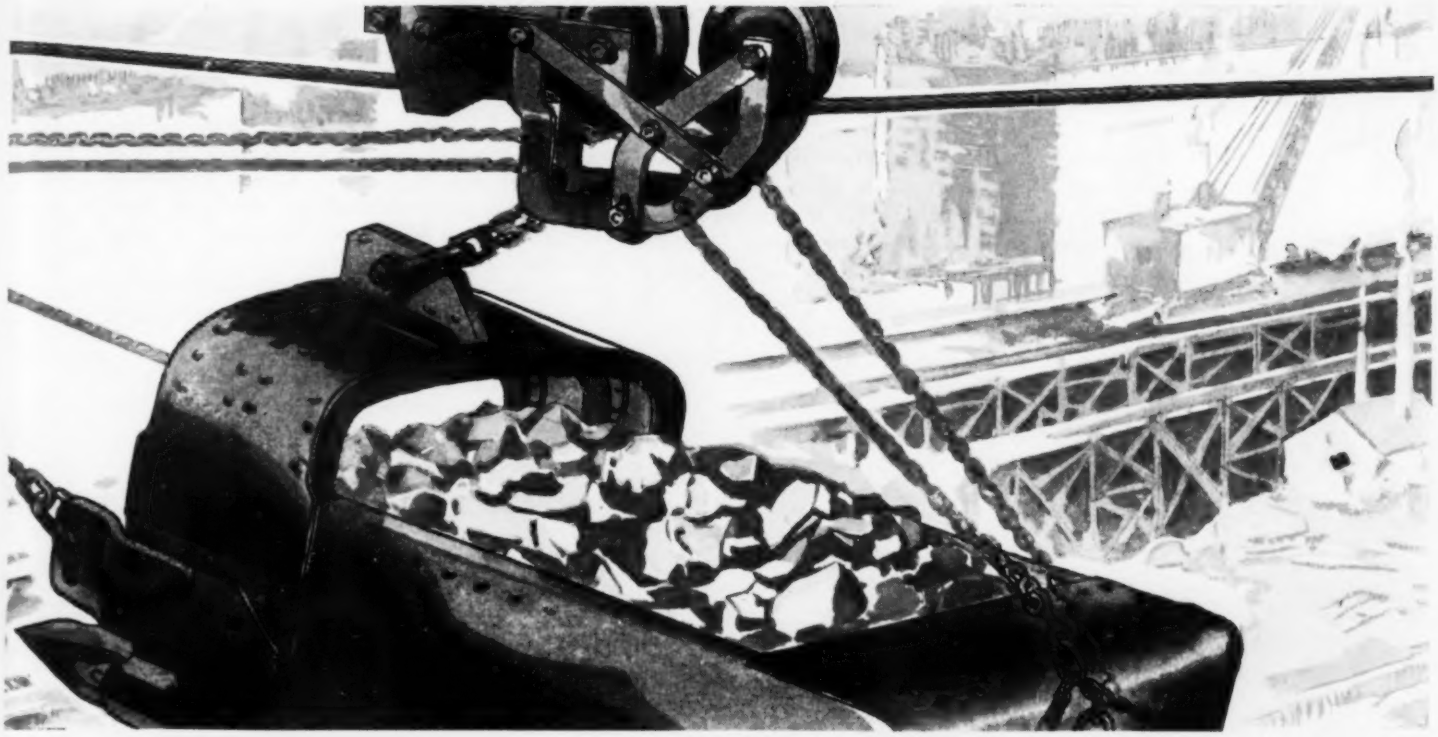
that assures maximum economy

In buying wire rope it is your aim to secure the rope which will give you safe service at lowest cost. It is Roebling's aim to aid you...and it is in an enviable position to do so.

In making recommendations our sole interest is to see that you get the wire rope that will best meet your needs. And we are fully free to give you absolutely unbiased advice...first, because of the completeness of the Roebling Wire Rope Line; secondly, because we are not prejudiced in favor of any one kind of wire rope.

Made in a great variety of types and designs, Roebling Ropes span *every* wire rope need. They include Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of flexibility in both rope and strand con-

ROEBLING



BUYERS...

structions. In fact, there is no wire rope requirement that cannot be met by Roebling Rope with utmost service safety and at lowest operating cost.

These features of Roebling Advisory Service safeguard the rope buyer. They are his assurance of maximum rope economy with maximum safety.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON NEW JERSEY
Branches in Principal Cities *Export Dept.: New York*

WIRE · WIRE ROPE · WELDING WIRE · FLAT WIRE · COPPER AND INSULATED WIRES AND CABLES · WIRE CLOTH AND WIRE NETTING

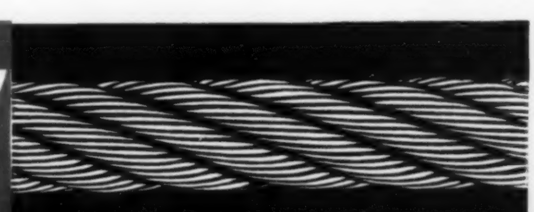
A plain statement about Wire Rope Economy

Roebling does not indulge in nor encourage sweeping claims of superior wire rope economy. Such claims, if generally made, would merely confuse the rope user. ¶ For the guidance of rope buyers, however, Roebling does assert that *when gauged by the work performed, NO wire rope,* regardless of make or construction, *will show lower general average operating costs than Roebling.*

Wire Rope for all purposes

The importance of selecting the right rope for each use cannot be too strongly emphasized. For no one rope will meet all requirements. ¶ Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. ¶ The great stamina of all Roebling Ropes is primarily due to the quality of Roebling Wire. This Acid Steel Wire is renowned for its fatigue resisting and wearing qualities. No better rope wire is produced. ¶ "BLUE CENTER" STEEL is the highest grade and is generally recommended for severe duty.

WIRE ROPE

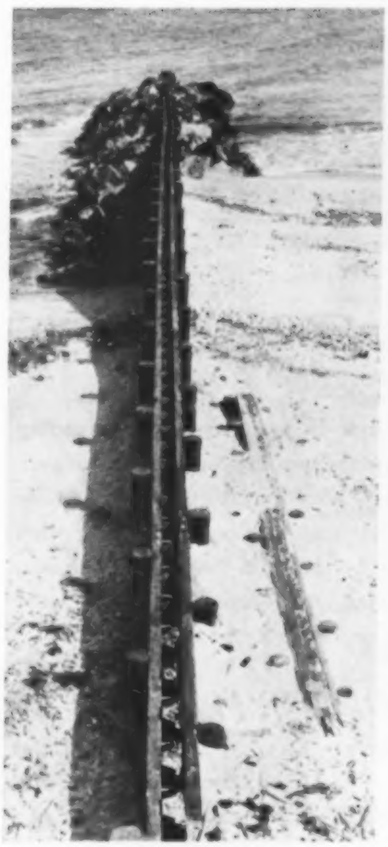


Shore Protection

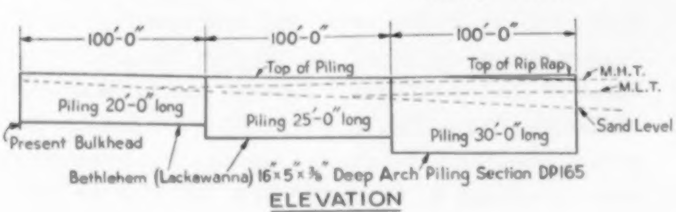
THE use of Bethlehem (Lackawanna) Steel Sheet Piling offers an economical and wholly practical method of preventing the damage caused to beach-front property by the washing and scouring action of waves. Jetties, sea walls and similar structures built of this piling are effectively protecting valuable stretches of shore property in many localities.

Bethlehem (Lackawanna) Piling is ideal for shore-protection structures. Its tight, interlocking joints form a continuous wall of steel which will not pull apart and which drifting sand cannot pass through. It possesses high lateral strength, offering great resistance to the pounding of the surf. It has a useful life of twenty years, or longer. It offers dependable shore protection at a cost below that of other types of construction.

Our piling engineers will gladly discuss with you the advantages of Bethlehem (Lackawanna) Piling in shore-protection structures.



Above: Jetty protecting shore property at Monmouth Beach, N. J. *At left:* 300-ft. Jetty at Long Branch, N. J. The building up of the beach on the right side of the jetty, as shown here, occurred in only six months. The construction of this jetty is shown by the drawing reproduced below. The above jetties were built of Bethlehem (Lackawanna) Steel Sheet Piling. The contractor for both jetties was Jesse A. Howland & Sons, Inc., Seabright, N. J.



Sea Wall for Floyd Bennett Field, New York City's Municipal Airport, built of Bethlehem (Lackawanna) Piling. Contractor: Charles F. Vachris, Inc. New York City.

KALMAN STEEL CORPORATION
Subsidiary of Bethlehem Steel Corporation
General Offices: Bethlehem, Pa.

BETHLEHEM STEEL

District Offices: Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Columbus, Detroit, Houston, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Syracuse, Washington. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM (Lackawanna) STEEL SHEET PILING


Stands up
under its own fast pace
Be decent to your Bucyrus-Erie. But don't be afraid to use its ample power. Responsive though it is, you'll find that it also has brute strength and toughness to stand up under the 1932 pace.
Bucyrus-Erie Company, South Milwaukee, Wisconsin. Branch offices or distributors in all principal cities.
BUCYRUS ERIE
A-443
CONTRACTORS SHOVELS
Gasoline, Diesel, Electric
1020 ½-yard
21-B ¾-yard
32-B 1-yard
37-B 1½-yard
43-B 1¾-yard
52-B 2¼-yard
GA-3 1¼-yard Gas + Air
Convertible Shovels — Draglines
Clamshells — Lifting Cranes


ROM START TO FINISH
irt, concrete and steel . . . contractors Spencer & Ross, Inc.,
etroit, handled all three with Lorain equipment on the
12,000,000 Harlem Valley State Hospital project at Wingdale,
.Y. Excavation—67,000 yds. turned out by a Lorain-75 shovel
14 weeks. Concrete—30,000 yds. or 90% of the total, was
ndled by a second Lorain-75 with a 75 ft. boom and concrete
ggies (pictured). Steel—the 2400 tons on the job were set by a
third Lorain-75. A Lorain job from start to finish.
HE THEW SHOVEL COMPANY • • LORAIN, OHIO
HEW LORAIN

Construction
Methods
ESTABLISHED 1919—McGRAW-HILL PUBLISHING COMPANY, INC.

ROBERT K. TOMLIN, *Editor*

VOLUME 14 NEW YORK, JULY, 1932 NUMBER 7

STEEL TRUSS SPANS are erected on wood cribbing and rolled into position before channel excavation is completed. Span at right has still to be placed on foundations.

Contractor, Following "Man-Bites-Dog" News Formula,

PUTS RIVER UNDER BRIDGE

REVERSING the usual procedure of building a bridge over a river, the Purdy Construction Co., of Mansfield, Ohio, in connection with the relocation of state highway No. 95, in Coshocton County, Ohio, built a three-span steel structure across dry land, excavated a channel beneath it, and then diverted the Walhonding River into the new course thus formed. Relocation of the highway shortened the distance and eliminated two sharp turns and an old one-way wood bridge which was replaced by the three steel-truss spans over the new channel. The new bridge was assembled on the ground during the construction of the piers and abutments and was moved on to its supports after they had been completed.

Wet Excavation—Foundation excavation extended to about 25 ft. below the existing ground surface and encountered some 13 ft. of coarse, water-bearing gravel and sand. The contractor worked out a method of disposing of the water without lifting it the 25 ft. to the surface. That portion of the channel immediately under the proposed bridge was excavated for the full length of the structure, and a drain of vitrified sewer pipe was laid from this excavation under existing highway to the river. The pumps then could be placed at water level.

Abutment cofferdams of steel sheet piling driven 5 ft. below the bottom of the footings were unwatered, and 93 wood piles about 30 ft. long were driven in each coffer. When the same procedure was attempted in the first of the pier cofferdams, the pile driving started serious sand boils along the wall of sheeting. The cofferdam, therefore, was allowed to fill with about 10 ft. of water, and 40-ft. piles were driven and later cut off at grade, after the pumps had lowered the water. Pier footings were poured at once to prevent further trouble with sand boils. The contractor built abutment and pier forms in sections on the ground and used the same sections twice in constructing similar structures. Forms for exposed surfaces were lined with plywood to reduce finishing costs.

Superstructure — Steel spans were assembled on timber cribbing about 4 ft. above the original ground at one side of the foundations. This method had several advantages: It permitted assembly and riveting of the steel while piers and abutments were being built; it eliminated costly falsework; and it enabled a crane with a 40-ft. boom to place all members in position. Erection of the steel on high falsework would have required either a much longer boom or falsework strong enough to carry heavy cranes.

Assembled spans were rolled as close as possible to the foundations, jacked to elevation and rolled into position on 6-in. wood rollers. Each span was pulled by cables running to the cranes.

W. W. Purdy was in general charge for the Purdy Construction Co., with W. G. Skemp as superintendent.

This Month's "News Reel"

DIESEL TRACTOR and power-driven elevating grader *(right)* make up Caterpillar outfit with which Harold Peterson, of St. Paul, Neb., builds 1 mi. of township road per 10-hr. day at fuel cost for diesel unit of $1.65.

DESIGN OF GRADE-SEPARATION BRIDGE over railroad crossing wins first place for Boris R. Leven, University of Southern California, in annual bridge design competion of American Institute of Steel Construction.

Wide World Photo

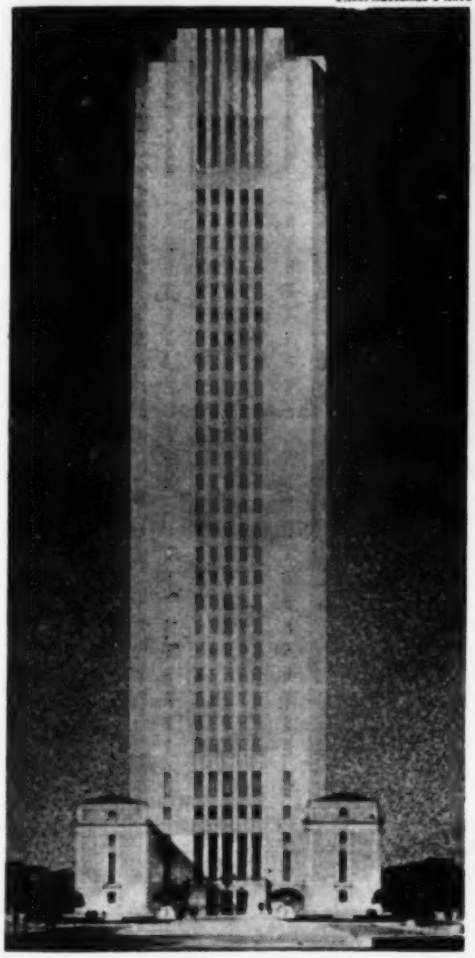
TO HOUSE MALE ATHLETES AT OLYMPIC GAMES, Los Angeles. Village of 550 two-room cottages, administration building, 1,200 ft. of dining halls, and open-air theater will provide lodging, food and entertainment for 2,000 men from 50 nations at flat rate of $2 a day. Cottages are specially-designed, portable units, 10x24 ft. in size, to house four occupants. All material will be salvaged.

NEW LOUISIANA STATE CAPITOL, Baton Rouge, has tower 70x70 ft. in plan reaching height of 450 ft. George A. Fuller Co., constructed project at total cost of $5,000,000.

International Photo

WINNING DESIGN *(below)* for proposed Columbia University skyscraper by Howard E. Bahr, of Sayville, Long Island. Flexible interior design of 30-story building provides for all prospective space requirements.

International Photo



K.L.M. Photo

RECLAIMING HOLLAND'S ZUIDER ZEE. Two important dikes meet at Den Oever, where navigation basin and ship lock are located. Railroad bridge across ship channel is under construction. From this point main dike extends 18 mi. northeast to Friesland.

Wide World Photo

ADDING 30 FT. TO HEIGHT OF ASWAN DAM, on Nile River, Egypt. Buttresses of reinforced-concrete faced with stone to harmonize with existing structure are built free from dam on downstream side, old stone face being dressed smooth and covered with plates of rust-resisting iron against which new masonry is placed. Masonry also is being added at top of structure. This raising is second for Aswan dam, 15 ft. having been added to height in 1907.

AGGREGATE PLANT

Has Production Capacity

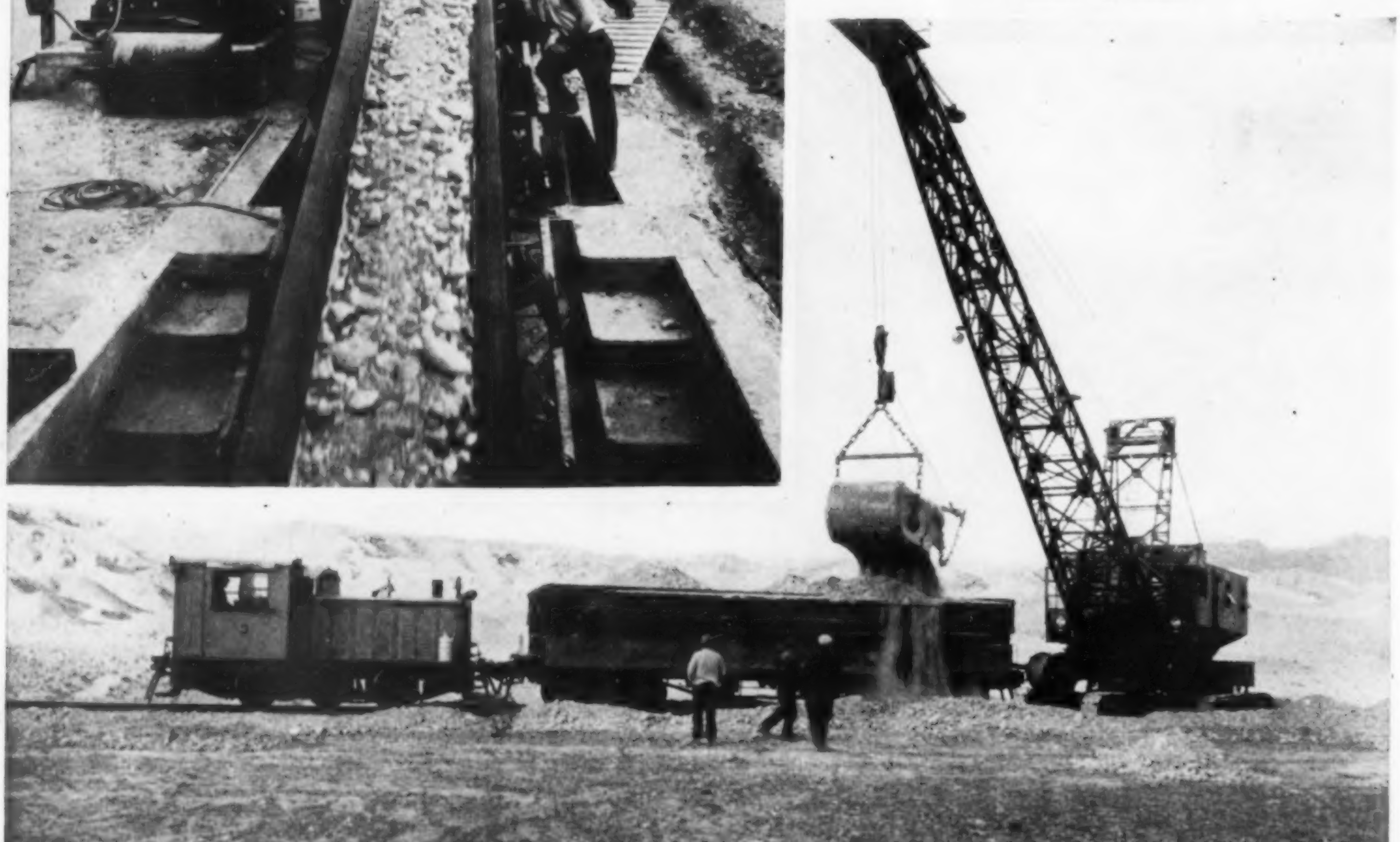
Installation by Six Companies Inc.,

4,500,000 CU.YD.

WITH a capacity of 500 tons of finished aggregate per hour, and with provision for doubling this capacity without interference with operations, the aggregate plant which is screening and grading material for the 4,500,000 cu.yd. of concrete that will be used in the Hoover dam project is a notable development in the field of aggregate plant design and construction. Built by the Six Companies Inc., contractor for Hoover dam, the plant is situated on a level area near the river about 4 mi. above the dam site. Design of the plant required the solution of problems involving several variable factors to assure ample reserve capacity and facilities for flexibility in operation. A description of aggregate production operation from gravel pit to the finished material ready for concrete mixing is outlined in the following notes, supplemented by pictures of these operations.

Gravel—The source of raw material is the gravel pit on the Arizona side of the river about 8 mi. above the dam site. This pit is reached by standard-gage railroad built by the contractor and

RAW GRAVEL *(left)* from track hoppers is elevated to scalping screen on 42-in. belt operating at 200 ft. per minute. Speed can be increased to 400 ft. 5-YD. ELECTRIC DRAGLINE *(below)* loads 30-yd. cars at gravel pit. Gasoline locomotive makes up trains.



FOR HOOVER DAM

of 500 Tons Per Hour— Will Supply Sand and Gravel for

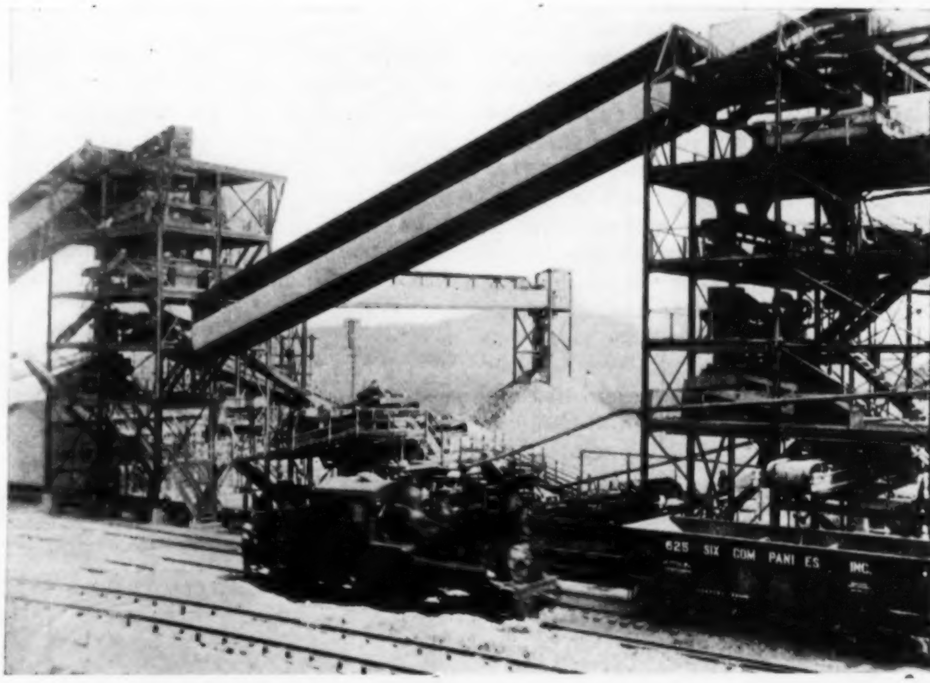
OF CONCRETE

the gravel to bunkers on the Nevada side of the river for reloading into the railway cars. It was decided, however, that the $25,000 trestle crossing for the trains, even though it was washed away four times, would be less expensive than the installation of the conveyor system and cost of rehandling.

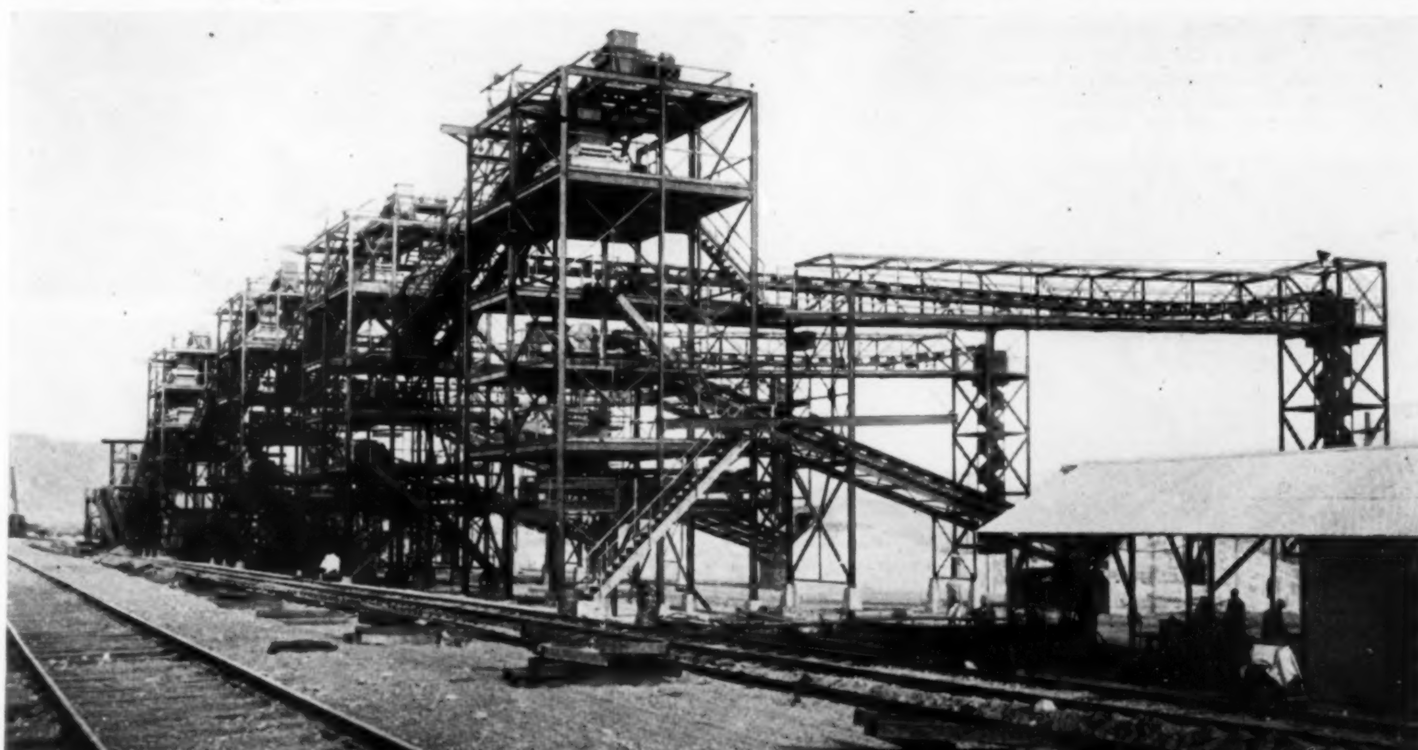
Operations of the railroad, which at present is using three trains with an average round trip of about 2½ hr., including loading and discharging, is carried on by telephonic dispatching by

includes an 850-ft. timber pile bridge across the Colorado River near the pit. Loading in the pit is done by a Marion Type 125, 5-yd. electric dragline equipped with an 80-ft. boom. This equipment loads directly into 30-yd. Western air-dump cars which are hauled in ten-car trains by steam locomotives to the aggregate plant. The overburden, which is estimated to average about 2½ ft. in thickness, is stripped with the same dragline.

Consideration was given to the use of belt conveyor equipment to bring



TOWERS 1 and 2 *(right)* of screening plant. Tower 1, at left, removes 3- to 9-in. cobbles and stores them at pile in background. Plant between two towers removes sand. Belt conveyor takes remainder of material to top of tower at right. EACH OF FOUR 60-FT. TOWERS *(below)* screens out one size of material which is taken by horizontal belt to live storage pile at right.



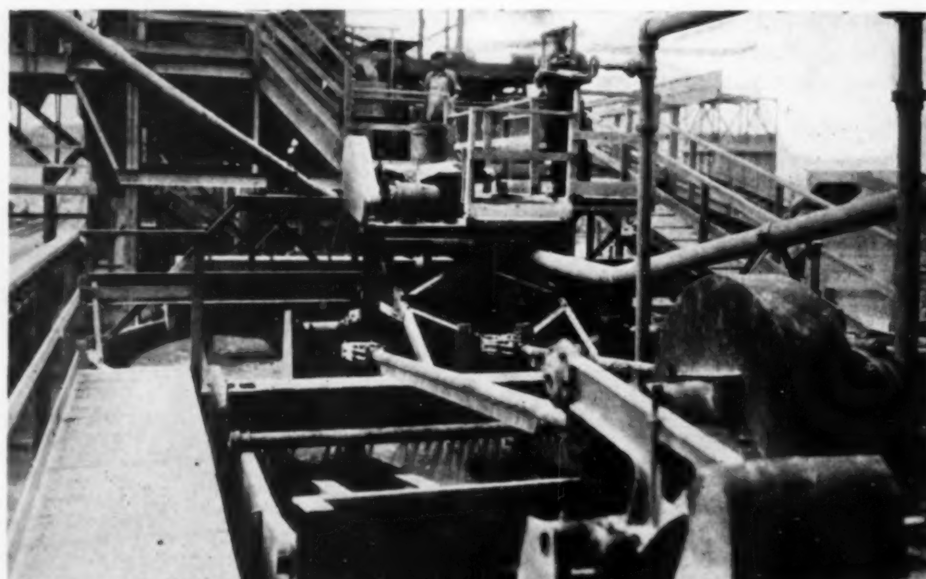
CLEARED AREA beyond plant is for storage of raw gravel. Tunnels under live storage piles may be extended to increase storage capacity. Portion of wash water clarifier appears in left foreground.

T. M. PRICE *(left)*, superintendent of gravel pit and screening plant; WILLIAM FUDGE, assistant superintendent; and NORMAN S. GALLISON, director of public and press relations, Six Companies, Inc.

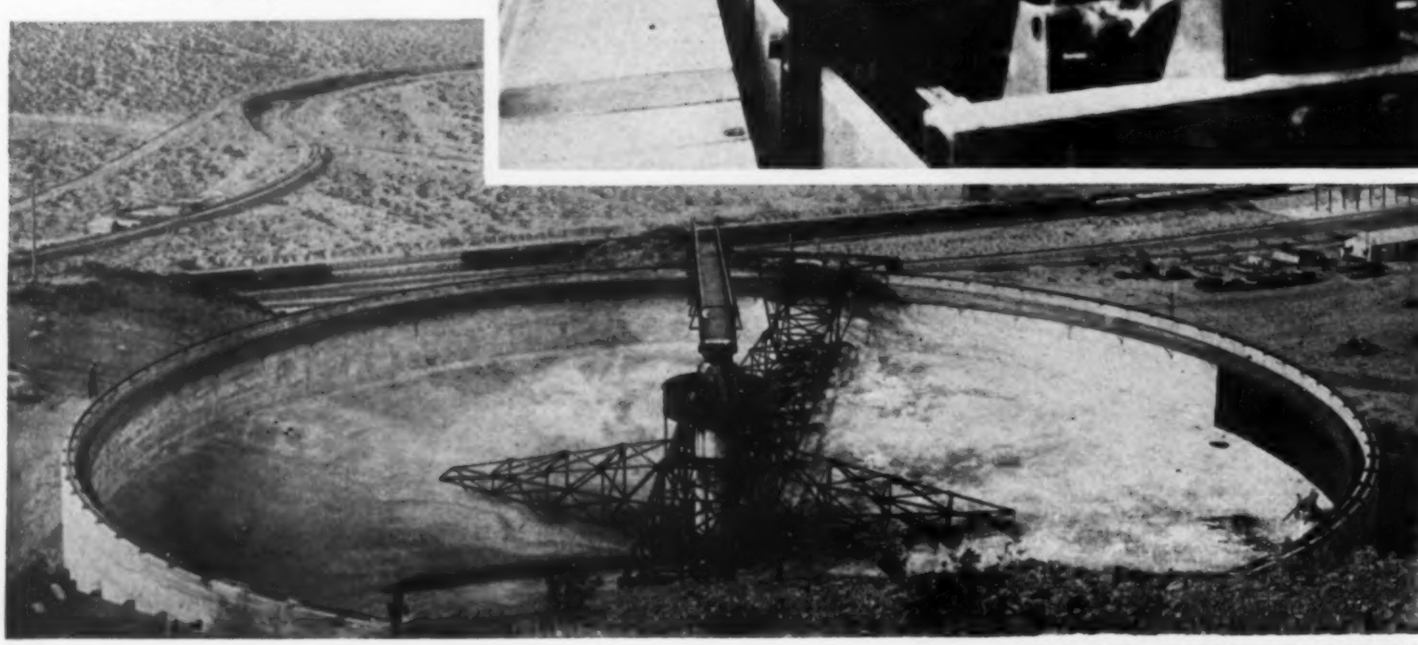
the train crews. Loading goes on three shifts per day and averages about 200 cars per day. Although the cars are of 30-yd. rated capacity, the loads usually average about 35 yd.

Because the gravel pit will be flooded before the dam is completed, and to provide for periods when the bridge may be out, the removal of material for raw storage near the aggregate plant will be carried on as rapidly as possible. A space has been cleared near the aggregate plant, and material which is not needed for immediate use, is stored "pit run" on this area.

Plant Design—Three distinct problems required solution in the design of the screening plant. The variables involved were: (1) Lack of knowledge as to whether wet or dry screening would be used; (2) possibility that the proposed rate of concrete placement would be materially increased, requiring increase in aggregate plant capacity; and (3) inability to forecast the amount of live storage needed. Solutions to those problems in plant design were taken care of as follows: (1) The plant was equipped to operate with either wet or dry separation; (2) provision was made in design and construction so that the capacity of the plant could be doubled without seriously interfering with production; and (3) provision was made for any reasonable extension of the live storage piles.



SAND WASHING AND CLASSIFYING EQUIPMENT *(right)*. Two raking classifiers and one bowl-type classifier (in background) produce finished sand of any modulus required. WATER CLARIFYING PLANT *(below)* has 800,000-gal. concrete tank and equipment for reducing turbidity of wash water to not more than 500 parts per million.



MOVABLE UNLOADER equipped with transverse conveyors transfers sand from belt to stockpiles.

Hoppers and Feed — Trains approaching the plant discharge into track hoppers with a live storage capacity of three 10-car trains. These hoppers are equipped with vibrating feeders discharging on to a 42-in. conveyor belt which elevates the material to the scalping screen. Raw gravel is run over this revolving unit for removal of material larger than 9 in. which is taken by conveyor to a gyratory crusher.

The top of the scalping tower is occupied by the control station where push button equipment provides individual control for the motors used to operate the plant. Switches for the motorized units are centralized in this location for convenience in control. Units are so arranged that any stoppage will automatically stop all operations ahead of the difficulty and at the same time allow operations in other plant activities to continue.

The product through the scalping screen is elevated to the top of the first of four 60-ft. structural steel towers and passes through the cobble screens equipped with 2¾-in. square holes. This screening arrangement is similar to all the other units consisting of a double set of double-deck vibrating screens with separate motor drives. The product of this screen is delivered by horizontal conveyor belt and stone ladder into live storage. This material is classified as cobbles with nominal size of 3 to 9 in.

Immediately after removal of cobbles, the remaining material is run over the sand screen for removal of all material less than ¼ in. in size. This fine material passes through the sand plant located between the first and second screening towers where it is screened and classified by Dorr equipment to conform to the modulus requirements of the specifications. Analysis of the sand contained in the pit run gravel indicates that there is a decided excess of the 28-48 mesh size which must be removed. The sand first passes through two rake-type wet classifiers which segregate the 28-48 mesh size. This material is then split and at present one-third to one-half of it is removed and wasted. The remainder of this size, together with the rest of the sand, is recombined and passed through a bowl classifier where the washing action removes the silt content below the 200-mesh material and the final product is dewatered in a third raking classifier. The finished sand moves by conveyor belt to storage piles on the other side of the loading tracks. Loading for transportation to the concrete plant is done by locomotive crane and clamshell bucket from the top of the pile into the cars to facilitate the control of the moisture content.

Aggregate Screening — The remainder of the material, which is finer than 3 in. and coarser than ¼ in., passes to the top of the second screening

LIVE STORAGE PILE for one of four sizes of coarse aggregate. Each screening tower has similar storage pile behind it. Horizontal conveyor takes material from screening tower and drops it down stone ladder on to storage pile. Vibrating feeder in tunnel under pile delivers material to inclined belt which carries it to tower for rescreening and loading into cars. In background is crushing plant for reducing raw gravel over 9-in. size.

tower where the material down to $1\frac{1}{2}$ in. in size is removed and transported to live storage piles. This process is repeated for the next size down to $\frac{3}{4}$ in. and the final screening accepts the material between $\frac{3}{4}$ and $\frac{1}{4}$ in.

Reloading—All of the live storage piles are provided with concrete tunnels having vibrating feeders for placing the aggregate on conveyor belts to return it to the individual screening towers where it is re-screened over screens of minimum size and then loaded into cars for transporting to the concrete plant. After re-screening and before loading each aggregate size is rinsed. The purpose of re-screening is to assure that the material is of the proper size and to eliminate broken pieces and the debris which may be blown in by the wind. The rejects from this final screening travel by common conveyor belt to the head end of the plant again.

Increased Capacity—The structural frame of the towers and conveyor bridges has been designed so that a duplicate installation of screening equipment can be made without serious interruption to plant operation. This duplicate installation would bring the capacity up to 1,000 tons per hour.

Water Supply—The water supply for the aggregate plant and for locomotive use is pumped approximately 2 mi. in 12-in. pipe line and prepared for use on a hill adjacent to the plant. The water is lifted by three pumping plants and discharged into an 800,000-gal. circular concrete reservoir equipped with Dorr equipment for removal of the silt. The turbidity of the wash water is the same as that specified for the concrete mixing water which is required to be not more than 500 parts per million. From the desilting reservoir the water flows by gravity to the screening plant except a small portion which is put through a water softening plant for the locomotive feed water supply. The water used at the aggregate plant is kept in a closed circuit and it is estimated that about 85 per cent of this supply can be returned to the clarifier for desilting again.

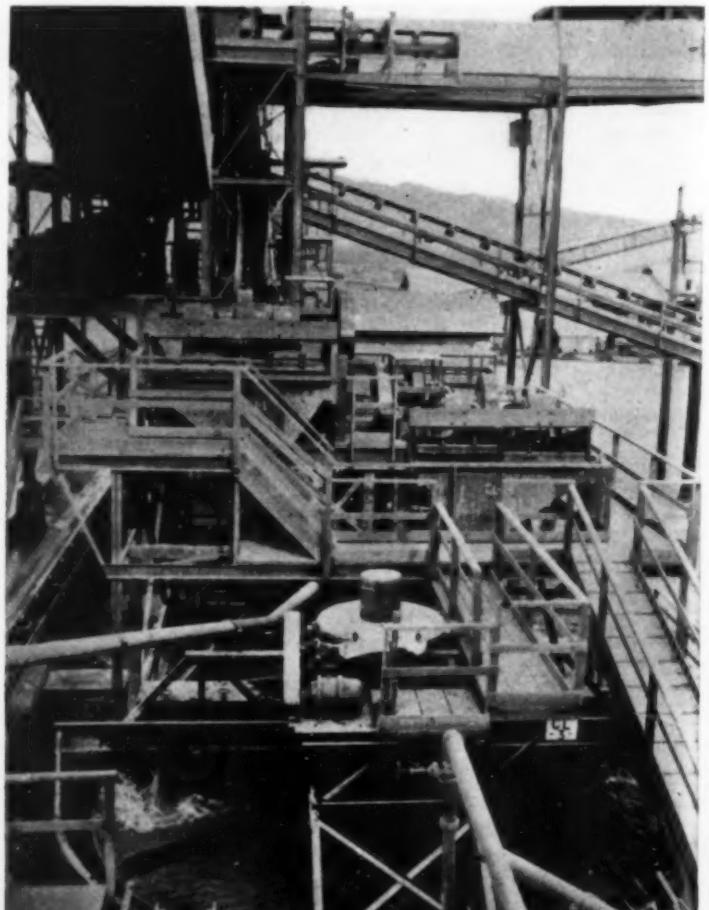
Personnel—Supervision of production and concrete operations for the Bureau of Reclamation is in direct charge of O. G. Patch reporting to Walker R. Young, construction engineer, Hoover dam project.

Under the direction of Frank T. Crowe, general superintendent, Six Companies Inc., the aggregate plant was designed, erected and will operate under the direct supervision of T. M. Price, who also is in charge of all operations from gravel pit to delivery of the screened aggregate. William Fudge and O. Haugen are assistants.

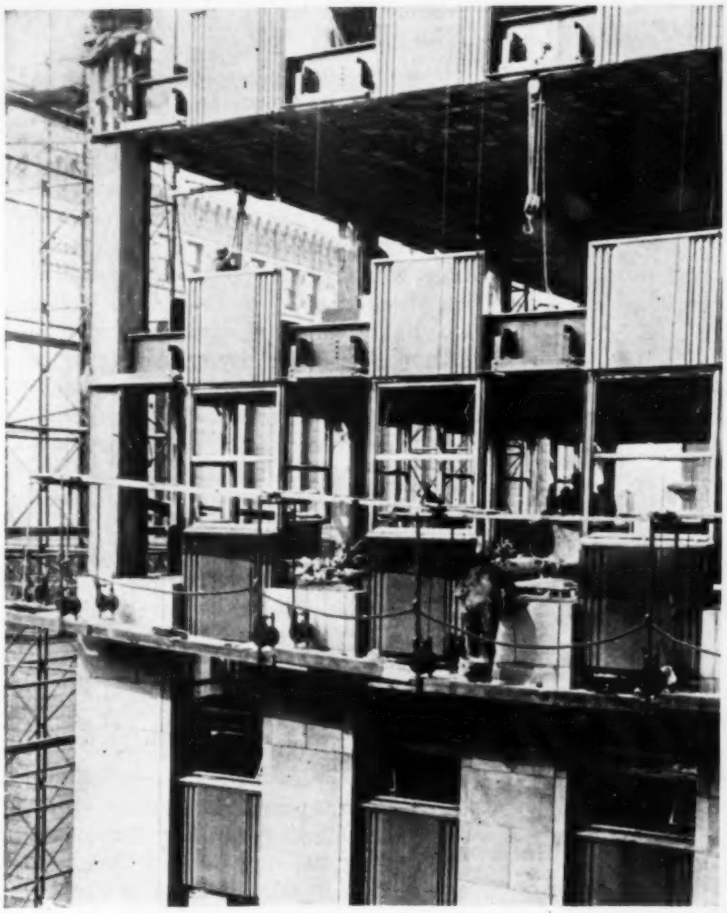
Equipment—Some of the major equipment installations in the plant are: Sand washing and clarifying—The Dorr Company, Inc.; conveyor pulleys and bearings—Link-Belt Company; belting—Pioneer Rubber Mills; screens—Nordberg Mfg. Co., Robins Conveying Belt Co. and Bodinson Mfg. Co.; vibrating feeders—Traylor Engineering and Mfg. Co. and Bodinson Mfg. Co.; crusher plant—Allis-Chalmers Mfg. Co.; conveyor idlers—Chain Belt Co.; pumps—A. R. Wilfley and Sons, Byron Jackson Co. and Ingersoll-Rand Co.; electrical equipment—Westinghouse Electric & Mfg. Co.; electrical supplies—General Electric Co.

The structural steel frame was fabricated and erected by the Pacific Iron and Steel Co., Los Angeles.

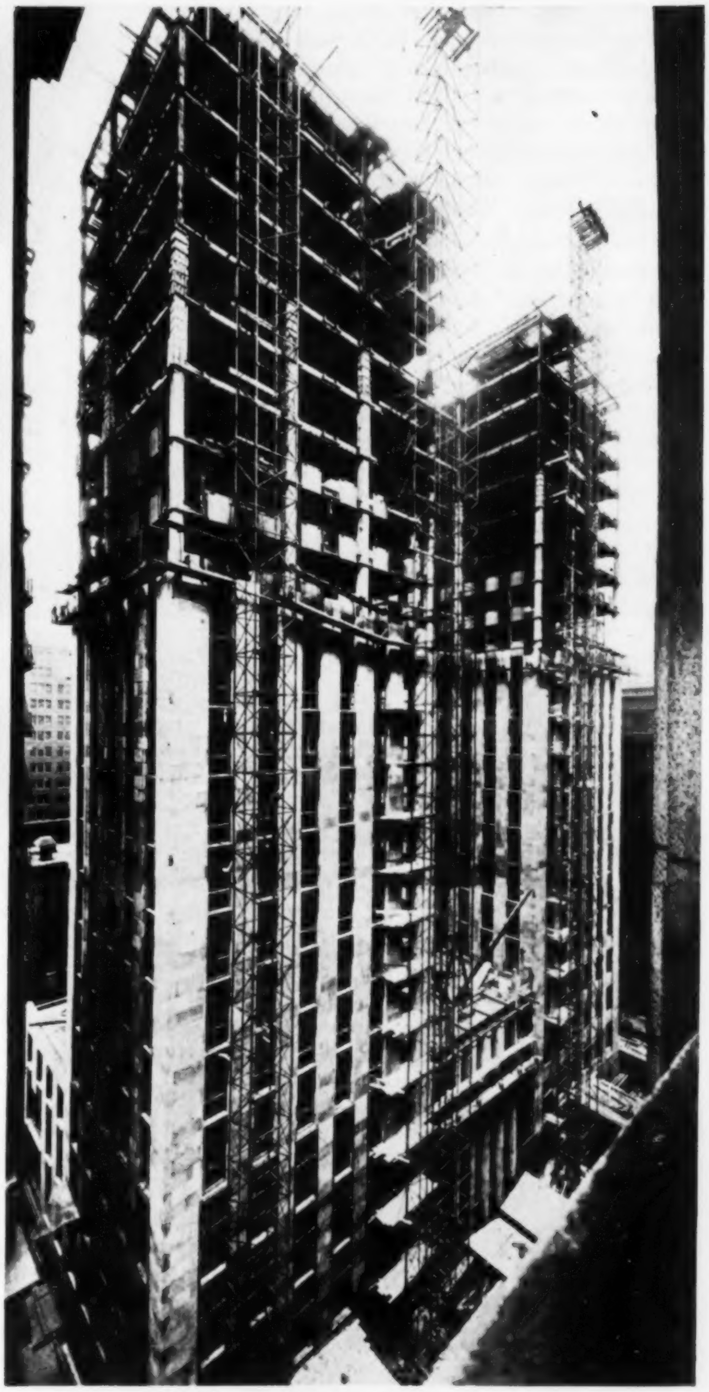
SHUTTLE CONVEYOR loads material into cars for delivery to concrete plant. Material is returned to tower from live storage pile at rear and is rescreened before being loaded.



BOWL CLASSIFIER washes sand and removes silt content below 200-mesh. Final product is dewatered by third raking classifier before transfer to storage piles.



CAST-ALUMINUM SPANDRELS and aluminum windows are used above fourth floor. Limestone facing and metal spandrels are backed up with brick.



FIRST UNIT of Field Building, facing La Salle St., rises to height of 26 stories. Tubular steel hoist towers on sidewalk deliver materials to upper floors.

FIELD BUILDING

Will Be Chicago's Largest Office Structure

ON THE site of the old Home Insurance building, one of the earliest skeleton-frame structures, the same general contractor who erected it is constructing today with great speed the first unit of Chicago's new Field Building, a modern giant which ultimately will have a gross floor area of 1,400,000 sq.ft. and rentable area of 1,000,000 sq.ft. The efficient organization of the general contractor, the George A. Fuller Co., by which the activities of numerous subcontractors are directed and controlled, is principally responsible for the excellent progress being made on the first unit of the project. In addition to the smooth functioning of the construction organization, an improved method of bracing deep foundation trenches, the use of metal spandrels and windows, and a light-weight porous concrete filler for the tile-arch floors lend further interest to the project.

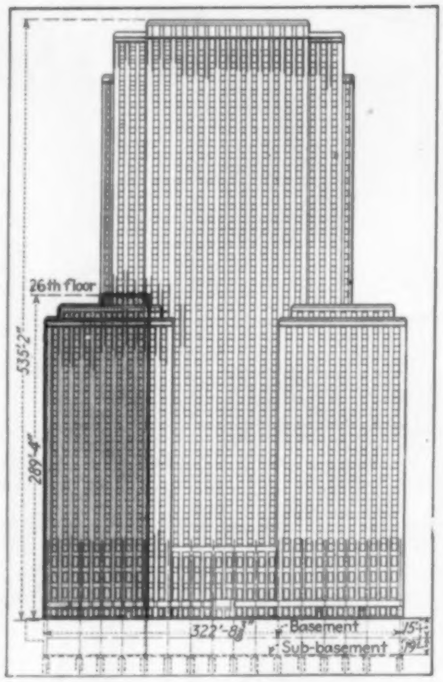
By May, 1934, when it is expected that the entire Field Building will have been completed, the structure will occupy the entire half block bounded by LaSalle, Adams and Clark Sts., with a frontage of 322 ft. 9 in. on Adams St. and of 189 ft. 5 in. on both LaSalle and Clark Streets. The structure, which will be the largest office building in Chicago, will have 42 stories and four basements. A tower containing 19 stories will rise above the main section of 23 stories, and the building will reach a total height of 535 ft.

As indicated by the accompanying plan and elevation, the first unit, now under construction, extends back some 90 ft. from LaSalle St. and rises to the 26th floor, where a temporary roof has been laid pending the construction of the second unit. The first unit contains only one bank of four local elevators, running to the fourteenth floor. Floors served by these elevators will be ready for occupancy some time this summer, but the twelve upper floors cannot be utilized until the second unit is com-

pleted. This second unit, to be ready for occupancy by May 1933, will extend 42 ft. further along Adams St. and will supply a second bank of four local elevators to the fourteenth floor and two banks of four elevators each to the 23d floor. The temporary roof at the 26th floor will cover this unit also.

Bracing Deep Trenches—General excavation under most of the building, and under most of the first unit, extends about 30 ft. below the street and provides for two basement levels. Along Marble Place, the alley at one side of the building, third and fourth basements are required for the heating and power plants. Portions of the walls for these basements were constructed under the first unit.

A subcontract for the foundation caissons and basement walls was awarded by the George A. Fuller Co. to the W. J. Newman Co., of Chicago, and this firm, in turn, sublet the shoring of trenches for the walls to the L. P. Friestedt Co., also of Chicago. The L. P. Friestedt Co. shored about 150 ft. of trench to 30 ft. below street grade, another 150-section to 50 ft. below grade, and about 60 ft. to a grade 62½ ft. below the street. In carrying out this difficult work, the contractor used an improvement of the method developed and patented by Frank P. Noe et al., of the L. P. Friestedt Co., for bracing trench walls with steel drums.



ADAMS ST. ELEVATION of Field Building. Shaded portion indicates first unit, which faces La Salle St. Entire structure will be completed by May, 1934.

The accompanying sketch illustrates the new method. By the former method, the steel drums, which are sections of 4½-in. pipe cut to required length, were left in the concrete, and the exposed end of the pipe was burned off in a cavity formed expressly for that purpose in the face of the wall. After burning off the pipe, workmen filled the rest of the drum and the cavity with concrete. The improved method permits the steel drum to be removed from the wall. A "stovepipe" sleeve of 28- or 30-gage steel around the steel pipe prevents the drum from bonding to the concrete. After the pipe has been removed, a pinch bar is used to crumple the sleeve, which is then withdrawn, and the hole is sealed with concrete against concrete. Salvage of the pipe reduces material expense.

TYPICAL FLOOR CONSTRUCTION employs tile flat arches between steel I-beam joists.

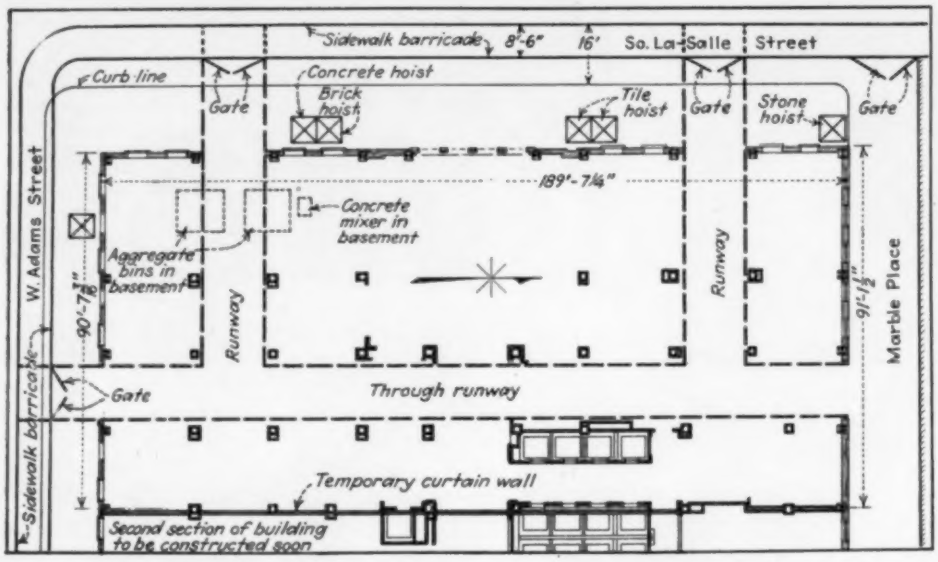
Caisson Construction—Excavation and concreting of the 52 foundation caissons by the W. J. Newman Co. were extremely rapid. Although these caissons were carried down by the open well method to bedrock at a depth 70 ft. below the footings of the adjacent eight-story buildings, no settlement or wall cracks resulted from the work. A row of regulating jack screws was installed under the walls of the buildings, and any settlement of the footings was taken up by these jacks.

Considerable infiltration of water was experienced in several of the caissons, conditions being particularly bad in about five. Two of the caissons required sacked cement to stop the leaks. Some of the caissons were left open to lower the groundwater level by pumping, and the contractor was successful in lowering the water level about 10 ft.

Job Organization—Regarded as a whole, the project is another example of rapid construction by a large number of subcontractors under the direction of a capable general contractor. Like nearly all of today's office-building jobs, the project has been a race against time, with success dependent upon service of supplies. The George A. Fuller Co. has maintained rapid progress by exercising strong supervisory control but has placed individual responsibility for completing work within the specified time limits on the sub-contractors or the foremen of the various trades. The job organization has been headed by a general superintendent, to whom the materials clerk, subcontractors and foremen have reported.

Quantities required by each trade for each stage of the construction were worked out in advance. The materials clerk gave this information to the men in charge in ample time, and it then devolved upon the subcontractor or the foreman to order the materials, see that deliveries were made, and provide sufficient workmen to complete the operation within the time limit. Occasionally, these subordinate functions had to be controlled and executed by the general contractor's staff; but usually the subcontractor's organization was capable of discharging them without further supervision. Ordinarily, the general

BEAM FIREPROOFING is hollow tile. Columns are incased in concrete.



LAYOUT OF CONSTRUCTION PLANT. Ample space for hoists is available between building and sidewalk barricade. Trucks dump from driveway into aggregate bins.

contractor has specified only the quantities of materials required, the time for starting the operation, and the time when it had to be completed.

Steel Erection—The 5,800 tons of steel in the structural frame of the first unit was erected at the rate of four floors a week by the Oscar Daniels Co., Chicago. Setting the first column on Dec. 10, the steel erector had the frame practically completed by Feb. 5 and had finished the entire erection by Feb. 10.

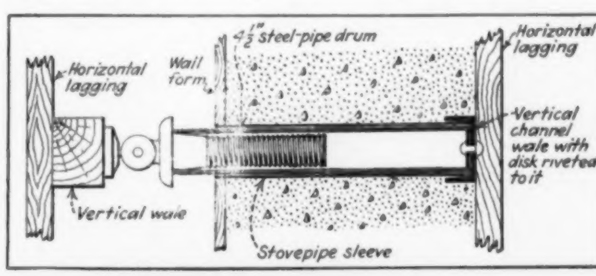
Steel-pan stairways of the building went up with the structural frame, making it unnecessary for the workmen following the steel erectors to use ladders. One week after steel had been erected to the fourteenth floor, a passenger elevator had been installed and was in service to this floor.

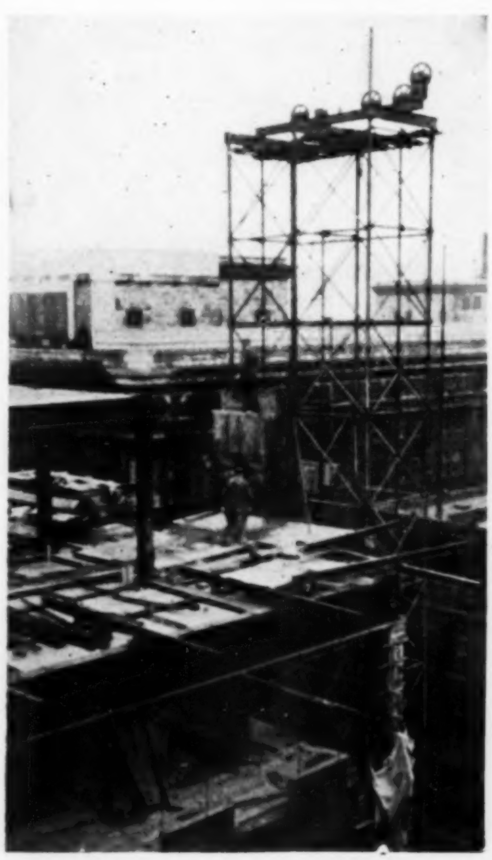
Plant Layout—Equipment for general use in the construction of the building was installed by the George A. Fuller Co. and rented to the subcontractors. In laying out the job, the principal requirements were: (1) Easy truck access to the building on the ground floor; (2) an adequate number of hoists, located outside the building line, to assure delivery of materials for the various trades; (3) equipment capable of withstanding 24-hour-a-day service without breakdown; and (4) a foolproof signalling system for the hoists. It was determined that six hoistways, operated day and night, would be sufficient to deliver materials as rapidly as needed.

As indicated by the accompanying plan, two double-compartment towers and one single-compartment tower were located along the LaSalle St. frontage, and one single-compartment tower was placed on the Adams St. sidewalk. A through driveway from Adams St. to Marble Place and two connecting driveways from LaSalle St. provided ample access for truck deliveries. Only one hoisting tower, a double-compartment unit for concrete and brick, extended below the sidewalk level. This tower was carried down to the basement to provide for concrete and mortar mixers on that floor. Six Thomas double-drum electric hoists, located on the sidewalk outside the building line, operated the six hoisting units. All the towers were of tubular steel. Five of them were equipped with platforms; the concrete hoist ordinarily carried a 1-yd. bucket, but it could be changed to a platform in 5 min.

Mixing Plant—As shown by the

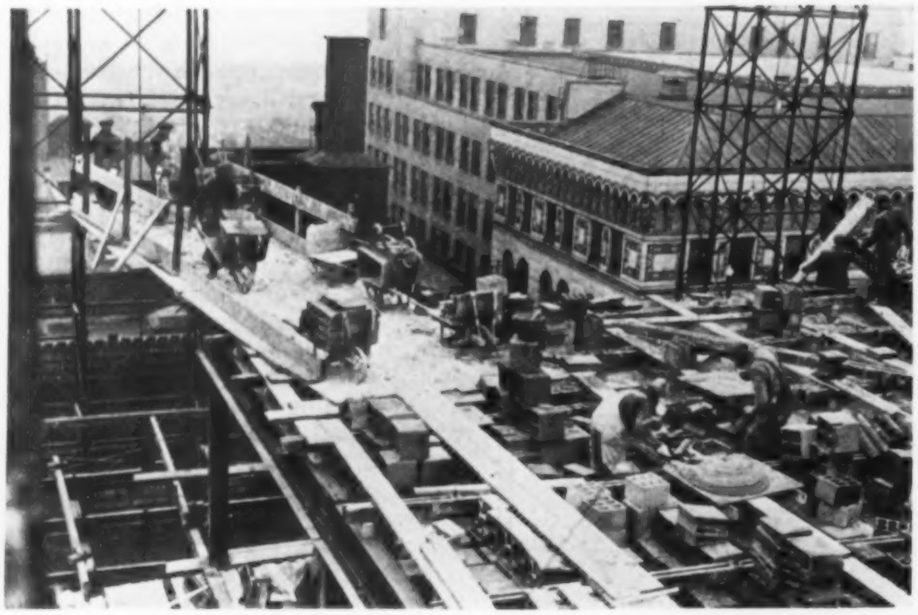
NEW METHOD *(right)* of bracing trench utilizes stovepipe sleeve around steel drum, permitting both drum and sleeve to be removed when form is stripped.





CONCRETE TOWER BUCKET delivers to double hopper which feeds wheelbarrows.

ALUMINUM WINDOWS are attached to upper and lower spandrels, which support them temporarily. Bricklayers back up spandrels and stone facing.



TILE AND MORTAR are brought up in wheelbarrows by hoist from ground floor.

CONCRETE *(right)* is distributed from tower hopper and placed by wheelbarrow.

same plan, aggregate bins were placed on the basement floor under one of the runways entering the building from LaSalle St. to permit trucks to dump directly from the driveway into the bins. As clearance on the basement floor was only 14 ft., it was impossible to obtain gravity delivery of aggregates from the bins to the mixer, which was located on the same floor. The contractor resorted to a belt conveyor to transfer the aggregates from the batchers under the bins to the charging hopper of the $\frac{3}{4}$-yd. mixer. A 13-ft. rotary mixer in the basement supplied mortar for the bricklayers. All this equipment was electrically driven.

Hoist Signal System—As all the towers were clear of the building, the signal man for each hoist was stationed at the top of the tower where he had an unobstructed view of loading and unloading operations at all floors from the first to the 26th. This man was the only one permitted to signal the hoist operator. His signals were given by electric bell.

Ordinarily, the man at the top of the tower could receive waved signals from the floor where the platform was unloaded. An auxiliary electric line with push buttons on every floor was provided, however, for giving bell signals when necessary to the official bellman at the top. The electric circuit from the top of the tower to the bell in the hoist operator's house also was equipped with a push button on each floor for the exclusive use of the official bellman, when he happened to be stationed on a floor instead of at the top of the tower.

The operators of all the hoists except those for concrete and brick, which ran to the basement, could watch the loading of the platforms directly in front of their houses. The two hoists loaded in the basement were close enough to the operators' houses for these men to hear directions shouted from below, and ordinarily orders were given in this way. Electric-bell systems were available to signal these operators from the basement when desired.

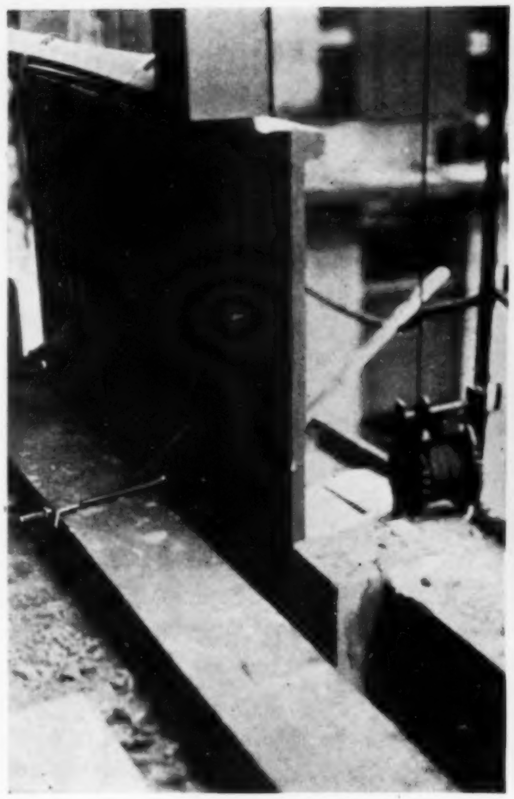
Floor Construction—Floor spans varied from less than 20 to more than 30 ft. The floors were of tile flat-arch construction with steel I-beam joists spaced 5 to 6 ft., c. to c. Most of the tile was 12 in. deep, sufficient to provide 2 in. of fireproofing under the bottom flanges of the joists and to leave a level ceiling for the plaster. A light-weight filler known as Aerocrete was used on top of the arches. Depth from the finished floor surface to the top of the tile is 5 in.

Aerocrete is an ordinary concrete mixture to which has been added an alumina compound. This admixture produces a chemical action which causes the concrete to rise and forms gas cells in the mass. Its action is similar to that of yeast in bread dough. The resultant concrete is porous and light-weight and has fire-resistant and sound-insulating properties.

Finished floors of the arcade and lobby on the ground floor and of the corridors on the floors above are terrazzo. Office floors are hardwood, nailed to wood sleepers placed in the Aerocrete. The architects preferred this construction, although it is possible to nail hardwood floors directly to Aerocrete.

Variation from the tile flat-arch construction is found in the basements, where 12-in. concrete flat slabs are

CARPENTER builds forms for 6-in. flat slab of Haydite concrete on 24th floor, which varies from typical tile arch construction.



BRACKET AND BOLTED CLIP *(left)* support spandrel on upper flange of I-beam. Similar bolted connection fastens spandrel to lower flange. Stonework fits into angle at corner of spandrel.

ALUMINUM SPANDREL has four brackets, two of which provide for connection to upper flange of I-beam and two to lower flange. Stone is raised in skips by tower hoist and stored on floor.

used; in the first floor, which is a flat concrete slab of 6-in. maximum thickness; and in the 24th floor, which consists of 6-in. Haydite concrete slab.

Columns were fireproofed with concrete and beams with hollow tile. Permanent partitions were constructed of hollow tile and temporary dividing partitions of gypsum block. The temporary curtain wall on the unfinished side of the building is 8-in. hollow tile.

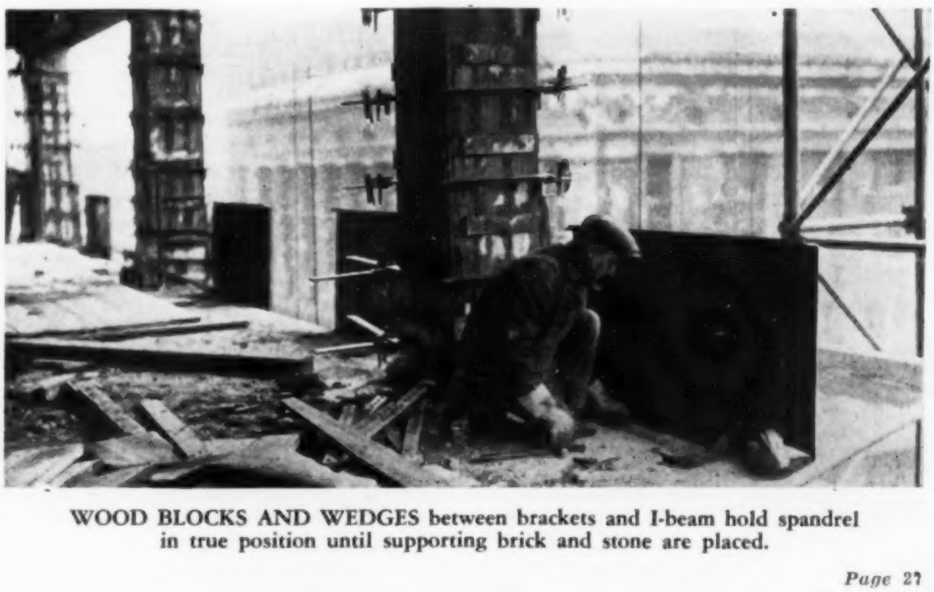
All tile construction was sublet by the general contractor to the National Fireproofing Co. This company rented for its exclusive use the two hoists in a double-compartment tower on the LaSalle St. front. A drum-type mixer on the first floor supplied mortar for the tile crew, which followed closely behind the steel erectors. Wheelbarrows were used to deliver both tile and mortar to the floor under construction. The tile arches were laid, in the usual way, on flat wood forms suspended by long threaded rods from wood joists laid across the steel floor beams.

Wall Construction—Walls up to the second floor level are faced with black granite in slabs about 4 in. thick and up to 10x10 ft. square. Above the second floor level, the facing is limestone. A procedure unusual for Chicago was employed in delivering the limestone to the job. This stone was sorted and placed on skips in the railroad freight yard. At the job, the skips were raised to the proper floor by a platform hoist. Workmen distributed the stone on the floor with hand trucks. During handling, the stone was protected against damage by liberal use of excelsior packing. A crew of fifteen stone setters carried up the wall facing at the rate of one floor a day. All walls were backed up with brick. Vitrified brick backing was used in the parapet walls to make them moisture-proof.

Most interesting of the items entering into the wall were the cast-metal spandrels and metal windows. Spandrels and windows on the first four floors are white bronze and on all the floors above are aluminum. The General Bronze Corp., of Long Island City, N. Y., supplied and erected the spandrels; the Truscon Steel Co., of Youngstown, Ohio, furnished and installed the windows.

The aluminum spandrels were light enough to be set in place by two men. As indicated by the photographs, the spandrels were attached to the upper and lower flanges of the exterior I-beams by bolted clips and were adjusted to accurate position by means of wood wedges. The aluminum double-hung windows, including sash, weighed only 98 to 105 lb. They were easily installed by two workmen, who attached them to the lower and upper spandrels. These attachments held the window in position until the surrounding stonework had been placed.

Supervision—D. H. McGorrisk, superintendent, is in charge of the project for the George A. Fuller Co. Graham, Anderson, Probst & White, of Chicago, are the architects.



WOOD BLOCKS AND WEDGES between brackets and I-beam hold spandrel in true position until supporting brick and stone are placed.

Non-Skid Pavement of
ASPHALT BLOCK
Has Recessed Transverse Joints

ASPHALT BLOCKS are laid against wood spacing strips which form transverse joint ⅜ in. wide.

TO ELIMINATE skidding hazards from a heavily-traveled section of 6 per cent grade on West 97th St. between Broadway and Riverside Drive, the department of public works of the Borough of Manhattan, New York City, specified an asphalt-block wearing surface of special construction having permanent recessed transverse joints ½ in. wide and ½ in. deep. Regan & Towers, Inc., the contractor for the paving work, formed these joints with the aid of wood spacing strips and of a special tool to rake out the grout filler to the desired depth.

On top of a substantial concrete base, the contractor placed a mortar bed averaging ½ in. thick to take up base irregularities and to provide a uniform surface for laying the asphalt blocks. This mortar was made up of 1 part cement to 2½ parts sand, to which was added a minimum of water. The mortar was thoroughly mixed by hand, although the general practice is to use a small mechanical mixer for this purpose. Workmen spread the mortar over the concrete base and struck it off with a templet to a smooth surface 3 in. below finished grade.

Forming Joints—As soon as the fresh mortar had been struck off, the laying crew began placing asphalt blocks, using wood lath ⅜ in. thick as separating strips between transverse rows of blocks to form joints of the required width. The blocks were 5x12 in. by 3 in. deep and were laid at right angles to the curb, making the spacing between transverse joints about 5½ in., c. to c. An experienced crew was able to lay 40 sq.yd. of block paving per

SPACING STRIPS in transverse joints are wood lath ⅜ in. thick. Single line of blocks, laid parallel with curb, has surface ½ in. below blocks at right angles to it, forming gutter to drain transverse joints ½ in. deep.

WOOD STRIPS are removed by prying them from between blocks, leaving straight, uniform joints.

JOINT FILLER of free-flowing cement grout is spread over surface and brushed into joints.

man-hour. The blocks weighed about 16 lb. apiece.

After the surface of the blocks on a freshly laid section had been leveled and adjusted, workmen removed the wood spacing strips by prying them from the joints. A free-flowing cement grout containing 1 part cement to 1½ parts sand then was poured over the surface and brushed into the joints until they were filled nearly to the top.

Raking Tool—When the grout had begun to dry but before it had taken its initial set, a special long-handled tool was used to rake out the joints to a depth of ½ in. At one end of the handle of this tool was a square plate which held four hardened steel bits varying in width from ⅜ to ½ in. These bits could be adjusted by means of set screws to the joint depth desired.

Joint Drainage—To provide drainage from the recessed joints, single rows of blocks were laid on the gutter lines, parallel with the curbs and ½ in. below the adjoining blocks, making the gutter surface flush with the bottoms of the recessed joints. By this construction, water is able to drain unobstructedly from the joints to the gutter.

RAKE with four steel bits of various widths removes filler from joints to depth of ½ in.

On this job, the completed pavement was closed to traffic for 7 days to permit the mortar and grout to gain serviceable strength. Use of high-early-strength cement on other projects has permitted opening to traffic in 48 hr.

Service Results—In several months service under traffic, the pavement has proved effective in preventing skidding under all kinds of weather conditions. Because the recessed joints are wide and easily drained, the dusting action of traffic and flushing by heavy rains serves to keep them clean. Neither on this project nor on a number of others which have been in use a longer time has formation of ice in the joints presented any difficulty. Passing vehicles break any ice film and whip melted snow out of the joints.

Supervision—The contract for the paving of West 97th St. was executed by Regan & Towers, Inc., of New York City, under the general supervision of Ralph Lewis and under the immediate direction of Edward Ryan, engineers of the department of public works, Borough of Manhattan.

COMPLETED PAVEMENT on 6 per cent grade provides non-skid surface in all kinds of weather. Elastic properties of asphalt blocks allow for expansion and contraction in wearing surface laid with grout-filled joints.

EARTH-FILL DAM contains over 1,100,000 yd. of material placed by trucks, tractor-drawn carts and conveyors.

MOTORIZED EQUIPMENT

Averages 10,000 Yd. a Day in Building Rolled-Earth Dam

INTRODUCTION of a belt conveyor system by R. G. LeTourneau, Inc., to transport earth fill from borrow pits to the site was a notable feature of building the Santiago Creek dam in Orange County, Calif., which was completed with an average construction progress of approximately 10,000 yd. of rolled earth fill placed per day. This earth-fill structure, 130 ft. high above streambed, containing over 1,100,000 yd. of material, was constructed as a joint storage facility for irrigation of The Irvine Co. property and the Serrano and Carpenter irrigation districts. The project was characterized by speed in placing the fill material and unusual concentration of equipment.

The structure is a typical rolled-earth-fill dam with a downstream slope of 2 : 1 and an upstream slope of $2\frac{1}{2}$: 1. The upstream portion consists of impervious material and the downstream section of pervious material. A 6-in. reinforced-concrete slab in 10-ft. square panels is placed on the upstream face.

Fill Material—A borrow pit composed of sand and gravel valley fill was opened in the reservoir floor adjacent to the dam to supply the pervious material for the downstream portion of the structure. The borrow pit for impervious material was in a small side canyon at an elevation little higher than the valley floor. Average mass haul from this pit was 2,200 ft. As construction progressed, satisfactory material was found on the hills upstream from the east abutment of the dam. This deposit consisted of terrace gravels, some of which contained sufficient clay for the impervious section. The contractor was fortunate in obtaining 300,000 yd. from this borrow pit at a reduced mass haul of about 1,200 ft.

Material was excavated in the bor-

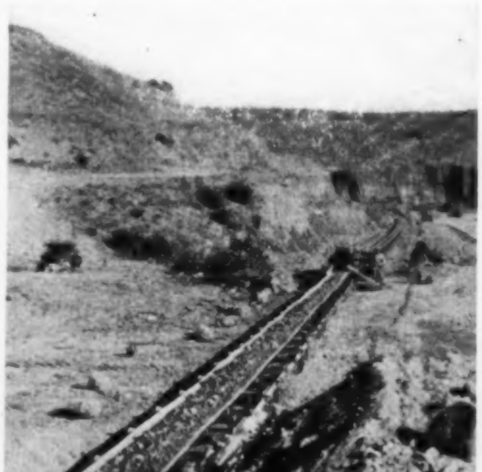
SPILLWAY is excavated in shale of west abutment. Shovels strip valley fill to bedrock in upstream portion of dam.

CONVEYOR 2,600 ft. long, made up of five sections, each equipped with 30-in. belt driven by 25-hp. motor at speed of 375 ft. per minute, delivers impervious fill material to carts drawn by 60-hp. tractors.

row pits by as many as seven shovels and one dragline during periods of maximum activity. The material in both pits provided easy digging, but the output of the shovels was not unusually high. Trucks and carts, drawn by tractors, transported practically all the material to the dam. A small part of the fill was placed by belt conveyors.

Conveyor System—Belt conveyors were placed on the valley floor to carry impervious material from the borrow pit to the dam. An attempt was made to follow the rising fill by use of welded steel trusses to elevate the discharge end of the conveyor. This method proved unsuccessful, as the grade of the belt soon become so steep that back movement of the material occurred. In the opinion of one of the engineers, if the conveyor had been constructed from the clay pit over the hills to an elevation above the completed dam, the material could then have been chuted into carts or trucks and placed on the fill.

It was found that the conveyor system lacked flexibility in the borrow pit. Two shovels loaded into a portable hopper over the belt. When a fresh cut had to be started, the two shovels were shut down for an average of about 8 hr. while the feeder section of the conveyor was moved over for the next cut. While the conveyor for impervious fill was in operation, it moved a total of 90,000 yd. of material, or an average of 147 yd. per hour. A subsequent attempt to use the conveyor for transporting pervious material from the upstream valley floor to the dam was discontinued after it had moved only 700 yd. of material.



MOVING MATERIAL at average rate of 147 yd. per hour, 2,600-ft. conveyor transports 90,000 yd. to upstream portion of dam.

Progress—During August the peak yardage of 399,439 yd. was placed in the dam. The maximum amount placed in one day was about 16,000 yd. It was possible to place this large yardage on so small an area principally because of the types of material available for the impervious and pervious sections. The impervious material was a fine silty clay which pulverized while handling and required no special operation. It also absorbed the necessary moisture by ordinary irrigation methods and thus speeded the spreading and compacting operations. Compacting was done by sheep-foot rollers manufactured by the contractor. Rolling was continued until daylight could be seen between the drum of the roller and the ground. Compacting was aided by the wide wheels and heavy loads of the tractor-drawn carts which

DAM is typical rolled-earth-fill structure with impervious upstream portion and pervious downstream section.

carried 12 yd. on two wheels. Such large yardages could not have been handled without these carts. During August there were as many as 35 trucks on the job in addition to the carts.

Yardages placed per month were as follows: prior to August 1, 1931, 59,704 yd.; August, 399,439 yd.; September, 286,190 yd.; October, 298,699 yd.; November, 59,737 yd.; or a total of 1,103,769 yd. Of this yardage the contractor placed 51 per cent with carts, including the yardage transported by the conveyor, and the rest was hauled by trucks. An interesting item of construction information is that the daily wagon count for yardage check averaged 2.2 per cent less than the yardage determined by cross-sectioning.

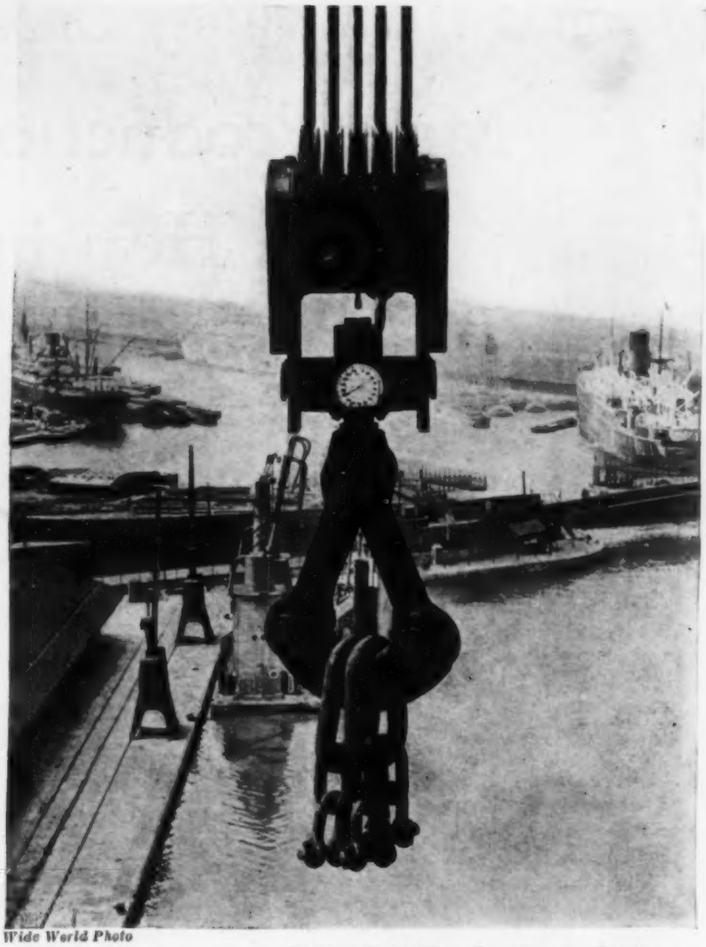
Equipment—Two Northwest 1½-yd. shovels loaded the charging hopper of the conveyor system, which was of Link-Belt construction with Emsco belts. The other shovels were two Koehrings, two Link-Belts, a P & H, and a Bucyrus converted to a 4-yd. dragline. Additional earth-moving equipment consisted of 35 dump trucks, seventeen Caterpillar 60-hp. tractors, six LeTourneau 12-yd. carts, five LeTourneau chariots, three LeTourneau 7-yd. scrapers, four LeTourneau bulldozers, two LeTourneau cowdozers, twenty units of LeTourneau sheep-foot roller, and one grader.

Personnel—The dam and appurtenant structures were designed and plans prepared in the office of A. Kempkey, consulting engineer, San Francisco. Preliminary surveys and exploration were executed by the engineering department of The Irvine Co., under the direction of C. R. Browning, chief engineer. D. W. Albert was resident engineer in charge of construction. Penn Watson, superintendent for the general contractor, R. G. LeTourneau, Inc., of Stockton, Calif., was responsible for moving the large yardage during the latter months of construction.

7-YD. SCRAPERS spread fill material on dam. Weight of earth-moving equipment aids compaction of impervious fill, which is completed by twenty units of sheep-foot roller.

Keystone Photo

SUCTION GRIP of specially equipped crane handles plate glass and other slippery objects in Paris, France.



Wide World Photo

FALL BLOCK of 150-ton floating crane, London, England, has calibrated mechanism for indicating loads on scale dial.

JOB ODDITIES

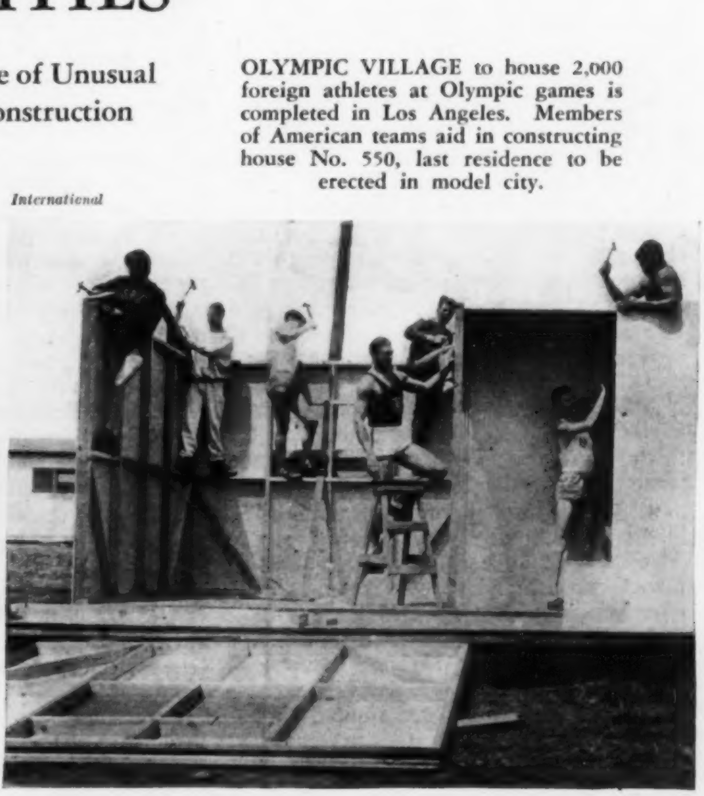
A Monthly Page of Unusual Features of Construction

LINK IN CANADA-MEXICO HIGHWAY is opened with dedication of Seattle's $5,000,000 bridge across Lake Union. Representatives of three nations join in cutting 60-ft. Douglas fir log used in lieu of customary ribbon.

Wide World Photo

OLYMPIC VILLAGE to house 2,000 foreign athletes at Olympic games is completed in Los Angeles. Members of American teams aid in constructing house No. 550, last residence to be erected in model city.

International



Architect Harvey Wiley Corbett predicts

Mass-Production Housing

Will create new building era in U. S.

●THE SMALL HOUSE PROBLEM is one that interests architects, even skyscraper architects. I am convinced that small housing has passed out of the "tailor-made" field and will enter into the mass-production or machine-made field.

Why is this going to happen? In almost every other thing that the human race uses, the big corporation and the mass-production factory have come into the picture and are taking over the work which was formerly done by individual craftsmanship. The automobile, of course, is an outstanding example, but so is the can of tomatoes, the bread in the kitchen, the work of the housewife.

The same thing is going to happen with houses. There is an economic factor in all this. In the first place, tailor-made houses—I use that term purposely—are expensive, just exactly as tailor-made clothes are. We are a well-dressed nation. Foreigners visiting this country speak of that fact. Why are we well dressed? Because we wear mass production clothes. The manufacturers of clothes can employ the ablest designer there is, pay him an almost fabulous sum to design the clothes, and still make money out of it because of the millions of suits of the same kind that he manufactures.

When it comes to a house, tailor-made, the owner can't possibly afford to pay an architect what he should receive to design that house intelligently. The architect ought to receive more than the cost of the house to study a small house problem thoroughly and to design it from an economic point of view with regard to living conditions and all the other related factors. Of course, that doesn't happen. The architect, as a general rule, doesn't appear in the picture of the small house.

A New Market—Industry today is confronted with the problem of finding something which can be manufactured and which the public will consume—some new thing. The market for the automobile is now largely one of replacement. The capacity of the existing automobile plants in America provides something like ten million cars a year. It won't take long until every man, woman and child, including the baby, will have to have a car. They know that that output is becoming more and more limited in its consumption. Radio sets are arriving somewhat at the same point. No one has thought of anything that the world needs which can absorb the output of mass production, with the possible exception of the small house. *That is the next thing the great corporations are looking into, thinking about as a possibility. If a small house can be produced on a machine-made basis, there is no reason why the great corporations shouldn't have an absolutely free and unlimited market replacing all the small houses now existing.*

The first thing they must do is to enclose space and make it more attractive in its arrangement, more sanitary in its appointments, more fireproof in its construction, more satisfying in its appearance, and at less cost than at present. If they can do that, the market is open to them, and the small house will become just as common and ordinary a commodity as the automobile is today.

I have often been asked, "What is going to happen to the architects when this occurs?" My answer is, "The same thing that happened to the carriage manufacturers who didn't get into the automobile business." The architects who are engaged in small house work might just as well realize now that they are confronted with this problem. Realizing that, I set up in our office two years ago a research laboratory and have had two or three men at work continuously and solely on this small house problem, to see whether a house could be designed which would be built just as an automobile body is built, carted in a truck to the site and there assembled with an outside limit of about three days for putting it together.

A great deal of experimentation has been done along these lines by certain corporations, but they haven't yet thought of this house from the point of view of a *new commodity*. They have still been trying to make a mass-production house which resembled, for some strange reason, either an English cottage or a French chateau. In my opinion, the public is not going to demand anything along those lines except a satisfactory arrangement of space, effectively and efficiently enclosed, and with possible variety of forms and types so that the houses won't necessarily all be alike.

Two Methods—There are two methods that strike me as possible means of construction in houses of this sort. One is a skeleton frame of steel and panels fitting into it. The other, and possibly the more economical of the two, is a form of paneled house in which the panels themselves form the construction and save the cost of the steel frame as a skeleton structure on which to hang the panels.

Both of these things will undoubtedly be developed—both of these ideas, as to methods—and I can look forward to the time when people will prefer to live in this type of machine-made house rather than in the thing which they look upon today as home.

In talking with various people, I find this reaction generally: "Oh, I wouldn't think of living in a machine house just like everybody else's." So I always ask them, "Well, where do you live?"

"Why, I live at number so and so, Park Avenue."

"Have you ever been in the apartment upstairs?"

"Why, no, I don't happen to know those people."

"Well," I reply, "get acquainted with them. You will find that you are living in an apartment exactly like the one they are living in, even to the button on the door."

HARVEY WILEY CORBETT, New York architect, foresees the early passing of the costly "tailor-made" house and its replacement by the machine-made house built by mass-production methods. His views, as expressed May 24 before the Small House Forum sponsored by the American Institute of Steel Construction, are given herewith, in slightly condensed form.

Not one feature of that fourteenth-floor apartment is different from the fifteenth floor. The only difference is that they have Louis XV furniture and you have Louis XIV. You are now living in a machine house of a certain type, and you are living just like everybody else in that particular apartment lives. You have lost your individuality as far as the form, the enclosing of space, and other details are concerned. Those same people have never thought of that. It struck them as a new idea. The same thing will be true of the small house.

I prefer to think of the house of the future, not in terms of what we normally call a home, but in terms of what I refer to as enclosed space. The reason I feel that way is that I see already the disappearance of the home as we in the mid-Victorian Age thought of it. The most important first step toward civilization which the human race took was

to settle and cease to be nomadic. When, instead of moving, they stopped and began agriculture, civilization, as we see it today, started. But we were originally a nomadic people.

Times seem to have changed, the cycle seems to have turned, and with our modern methods of transportation we have again become nomadic. The average individual doesn't want to tie himself to a piece of ground, to a home, in the old sense of the word, from which he can't move with ease. The reason is economic. The labor situation, the necessity of transferring individuals, both from the high executive down to the man in the bottom pit, to the point where his labor is wanted, means that the tying of the individual to a certain location is another thing that is past. We can no longer think in terms of a piece of ground, a fine old house on it, the family being brought up, the children and the grandchildren living in the same spot or in the same neighborhood and carrying on in that sense. If we have changed to a nomadic people, a people in movement, then the enclosed space in which we live must be constructed in a manner so that it, too, can be moved. There should be some replacement value in a particular house when the family moves out.

The House of the Future—So I visualize in the future a house which the people, deciding that they can own a small home, just as they now arrive at a point, in all walks of society, at which they can own an automobile, taking up a catalog, looking through it, finding the house that fits the needs of the young married couple, finding that in the course of time when children arrive they just send for another section and add a room. This whole thing, machine manufactured, will come complete and, in the course of years, with the furniture, just as we now buy an automobile. We don't have to buy any gadgets in order to take a car out of the shop.

People will select this house and if they are in the Ford class, it will be a Ford house; and if they are in the Rolls-Royce class, it will be a Rolls-Royce house, and they will be just as different as those two machines are different on the road.

You may think that it would be impossible to live in a machine house of that type, but you don't hesitate to drive along the road in your Chrysler or your Packard, and the fact that you pass another person on the road riding in the identical car in which you are riding doesn't offend you. You say, "There is somebody else who also knows an automobile and has good taste." You will feel exactly the same way about your house.

Cost vs. Weight—The important factor in this house production business is that things of that type cost in proportion to their weight. Think of the automobile again. The Ford automobile costs so much. Find its weight. Then go to the Pierce Arrow or the Packard or the Rolls and measure its weight, and you will be surprised to find that the cost is in proportion to the weight to a surprising degree. The same thing is true in housing, in enclosing space of any kind. The house of the future will be one-third

Keystone Photo

HARVEY WILEY CORBETT

or one-half the weight of the present house.

If you were to construct a four-story building, say the area of this room, in the ordinary method of steel construction, and then you were to take simply the steel supports of that building and cut them off and measure the cross section of steel used in that house, you would find that you had as many square inches of steel in the construction of that four-story house as there are square inches of steel in one of the cables that support the Washington Bridge across the Hudson River. If that isn't waste, I don't know what is.

When it comes to the weight question, you can see very readily that by reducing weight, we reduce cost. When we reduce cost, we offer a commodity which the public is ready to consume and ready to live in.

I remember one time, some years ago, I was speaking before the Royal Institute of British Architects in London, and I was talking about the life of buildings. I was discussing our type of skyscraper, and I was speaking of the life of buildings as we look at it in New York—an apartment house at 15 years, a hotel at 20 or 25, and an office building at 30 or 35 years. Irving T. Bush, for whom I built the Bush Building in New York, was in the audience. We were over there on the Bush work I had been doing for some 8 or 9 years in London. I described how the life of an office building was about 30 years. When we came home afterward, he turned to me and said, "Harvey, what do you mean by saying that the life of an office building is only a matter of 30 years? Do you mean to tell me that the building you built for me only 5 years ago is going to be of no use at the end of 30 years?"

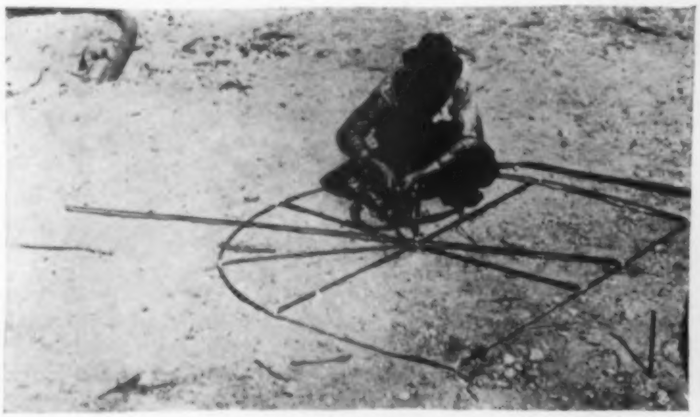
I said, "Mr. Bush, I don't know exactly what is going to happen in the next 30 years in regard to the change in buildings; but let me point out something to you. Supposing that across the street from the Bush Building, on 42nd St., a man were to put up a building, the weight of which, because of new methods of construction, would be one-half the weight of your building. That means that the structural cost would be about half your structural cost. Then suppose that it had methods of ventilation, methods of elevator operation, new wiring for radio, television, and other things that will come along that we don't know about, and he was able to offer space in that building at one-half the rent that you have to get in your building in order to make it pay. What is going to happen to your tenants? They are just going to walk out at the end of their leases and go across the street and into that new building. Therefore, your building is still structurally sound, still standing, still in perfectly good condition, as it was when it was built, but you have no tenants."

In housing, under machine production, with men at the head of the design departments of these great corporations, men of capacity, paid proper salaries for their work, you will get progress identical with the progress that has happened in automobiles, and you will get a fashion whereby in the course of 5, 10 or 15 years, as the case may be, nobody will be living in one of the dear Olde English cottages we so much admire today, unless they are obliged to because they are too poor to move to any other place.

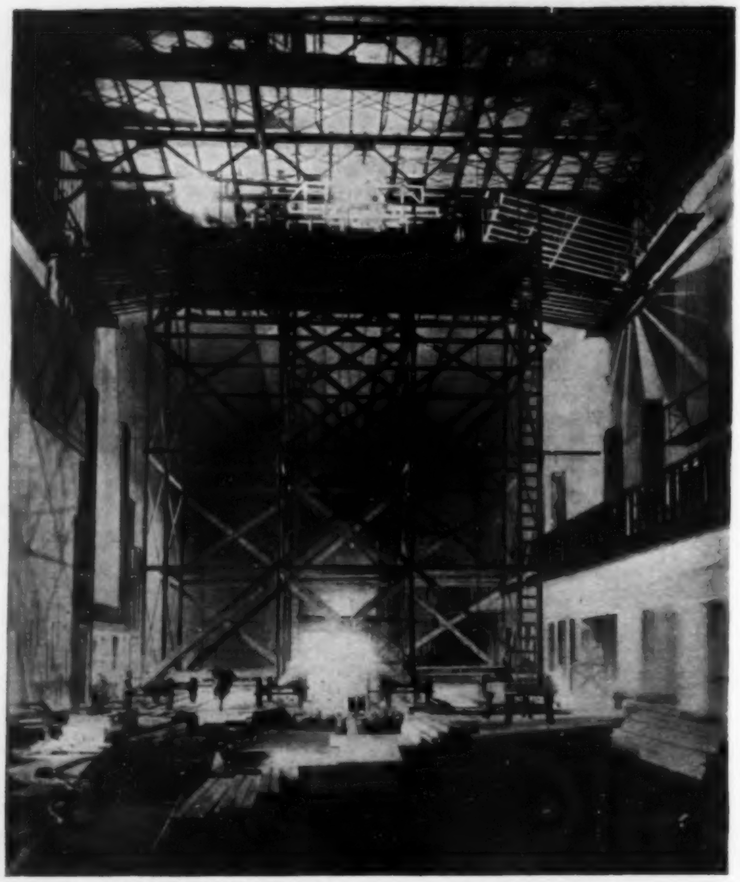
The modern machine-made house is going to be the thing that people will demand, and, as I see it, it is going to be the industry, the new, consuming industry that will bring us out of our present depression and give industry, as a whole, an opportunity to reestablish business, employ labor and capital, and put us back on our feet.

Getting Down to DETAILS

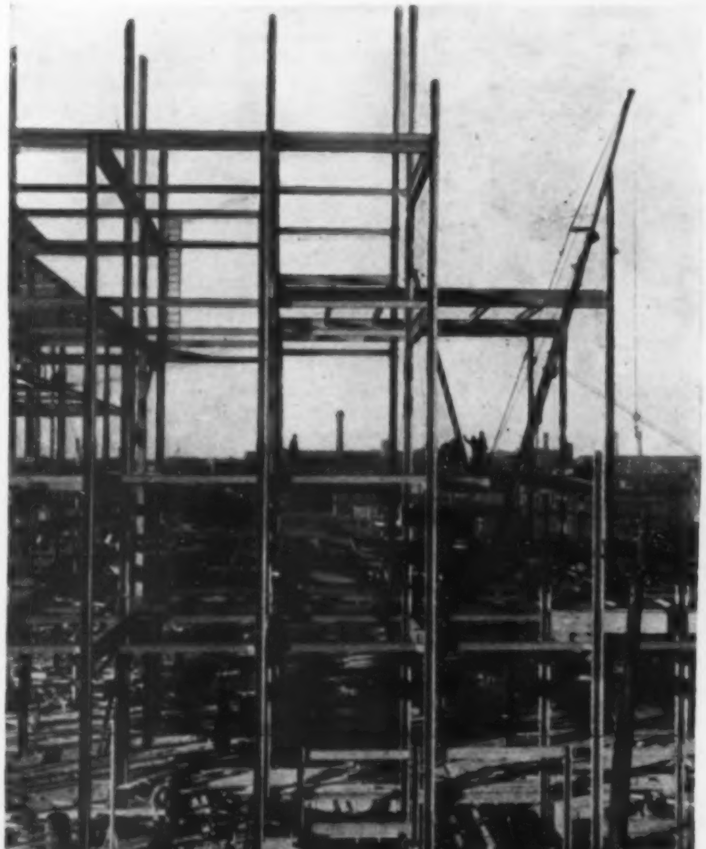
Close-up Shots of Job Methods and Equipment

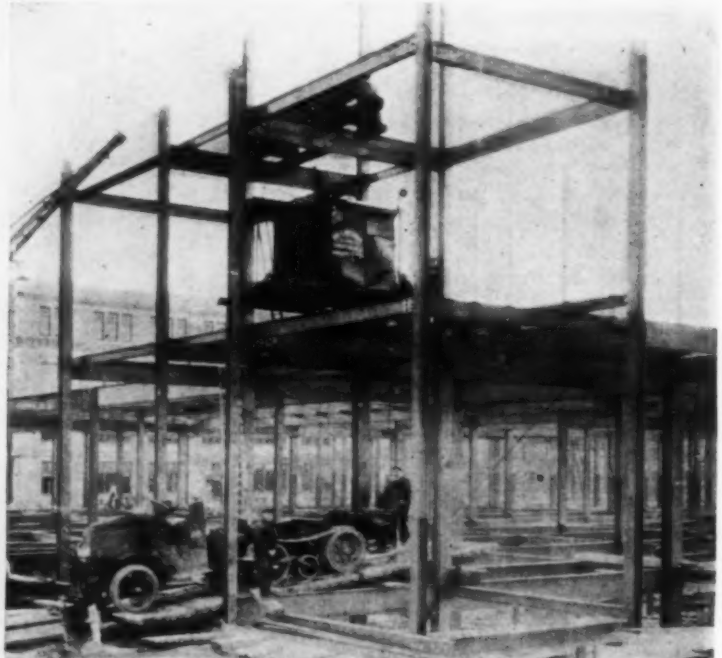


TEMPLET to check clearance in water tunnel 975 ft. long driven by J. J. Coughlan & Sons, of Boston, for city of Waltham, Mass., is made up of reinforcing rods with oxy-acetylene-welded connections.



MOVABLE SCAFFOLD mounted on wheels works in combination with hanging scaffolds in finishing high walls and ceiling of Great Hall in Hall of Science building, Century of Progress exposition, Chicago. McLennan Construction Co., of Chicago, general contractor.

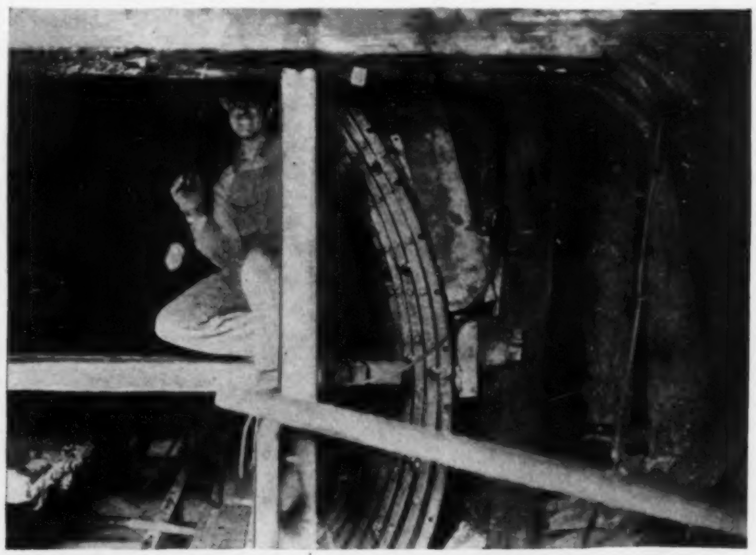




DISMOUNTED TRUCK CRANE *(above and left)* raises itself from floor to floor and erects 1,200 tons of steel in 33½ days for new postoffice and federal court building, Trenton, N. J. George C. Cochrane, Inc., of Trenton, removes Universal crane from truck mounting and moves it about on steel skeleton until erection is completed, when crane is restored to motor truck. Melvin Phillips superintends erection for George C. Cochrane, Inc.

DOUBLE-TRACK RAILROAD BRIDGE is jacked up on flat cars and moved 60 ft. to permanent position on completed abutments in 2 hr., 40 min. as part of Union Terminal Co.'s construction program. R. H. Goodrich Co., subcontractor for Ohio Valley Constructors, Inc., raises bridge with four 50-ton screw jacks and moves cars with trucks. Street passing under bridge is closed 12 hr.

BAG FOR BULK CEMENT developed by James M. Titcomb, of Washington, D. C., is waterproof, rubber-coated fabric container attached to partition in batch truck. Bags, which are filled after aggregates are loaded, lie flat on top of aggregates, sealed against weather by flaps folded over openings. Containers automatically dump cement with aggregates to prevent raising dust. Device has been in use 2 years in District of Columbia and has proved practical and economical.



STEEL LINER PLATES reinforce weak spots in Denver's Moffat water tunnel. Space behind lining of Truscon steel plates will be packed and grouted, and liner plates will be coated with ¼ in. of Gunite. Eventually concrete lining 1 ft. thick will be placed inside steel, reducing tunnel diameter to 10½ ft.

HAND PUMP refuels mixer from tank on truck without halting paving operations on contract of Adam Eidemiller. New Alexandria, Pa.

WIRE SAWS
Cut Rock Trench for Dam

By C. B. CORNELL

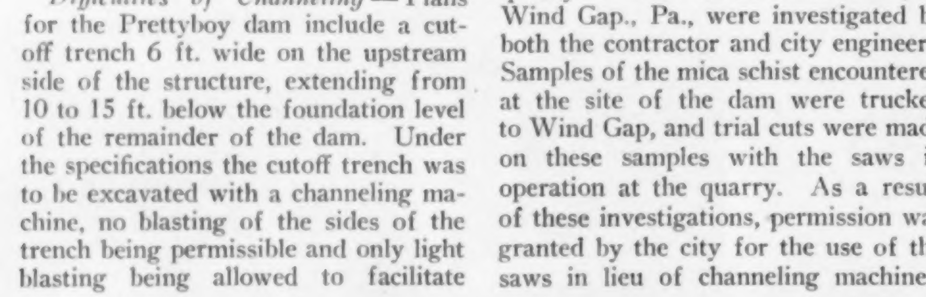
Construction Engineer, Dept. of Public Works, Baltimore, Md.

WIRE saws have proved effective in cutting sides of the cutoff trench for the Prettyboy dam, a water-supply project being constructed by the J A. La Porte Corp., of Albany, N. Y., for the department of public works of the City of Baltimore, as described in *Construction Methods,* April, 1932, pp. 36-37. Difficulty of using channeling machines on the irregular foundation and previous successful application of wire saws in slate quarries led to the adoption of this method at the dam.

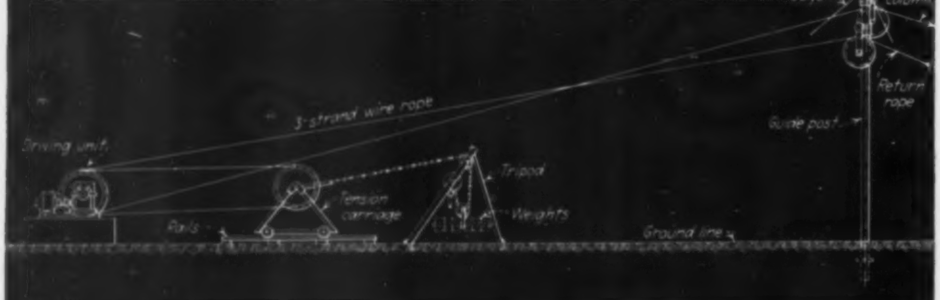
Difficulties of Channeling — Plans for the Prettyboy dam include a cutoff trench 6 ft. wide on the upstream side of the structure, extending from 10 to 15 ft. below the foundation level of the remainder of the dam. Under the specifications the cutoff trench was to be excavated with a channeling machine, no blasting of the sides of the trench being permissible and only light blasting being allowed to facilitate the mucking of the rock between the channeled cuts. Because of the large number of vertical steps in both the foundation and cutoff trench, on both sides of the valley, the use of bulky and heavy channeling machines would have entailed difficult handling of this equipment. Before any channeling was done, therefore, the J. A. La Porte Corp. consulted the Ingersoll-Rand Co., which in turn recommended the use of wire saws.

As a result of this recommendation, the wire saws in operation in the slate quarry of the Phoenix Slate Co., at Wind Gap., Pa., were investigated by both the contractor and city engineers. Samples of the mica schist encountered at the site of the dam were trucked to Wind Gap, and trial cuts were made on these samples with the saws in operation at the quarry. As a result of these investigations, permission was granted by the city for the use of the saws in lieu of channeling machines, provided the former produced satisfactory results in actual operation. Subsequently, one Calyx drill and four wire saws were purchased, the latter coming from the Stroudsburg Engine Works, Inc., Stroudsburg, Pa.

WALLS OF CUTOFF TRENCH are channeled by wire saws to depth of 6 or 8 ft. before rock is mucked out. Arrow indicates bit of Calyx drill.



DRIVING END of wire saw. Continuous wire rope is wound on power pulley of driving unit, and one loop is reeved over sheave of weighted carriage which maintains uniform tension in rope. Guide sheaves on steel post carry rope to and from cutting end of wire saw.



CUTTING END of wire saw. Columns erected in core-drill holes at ends of proposed cut carry fixed top sheaves and movable lower sheaves which can be screwed down as cutting progresses, keeping wire rope in contact with rock at bottom of slot.

Wire-Saw Operation—Operation of the saws in the mica schist at the dam site has been slow, and in a few locations the hardness of the rock has necessitated a resort to line drilling and broaching. In general, however, the saw operations have produced satisfactory results, and, because of the lightness and flexibility of all parts of the rigs, the work has been less expensive than previous experience would indicate as the probable cost of channeling machine operation.

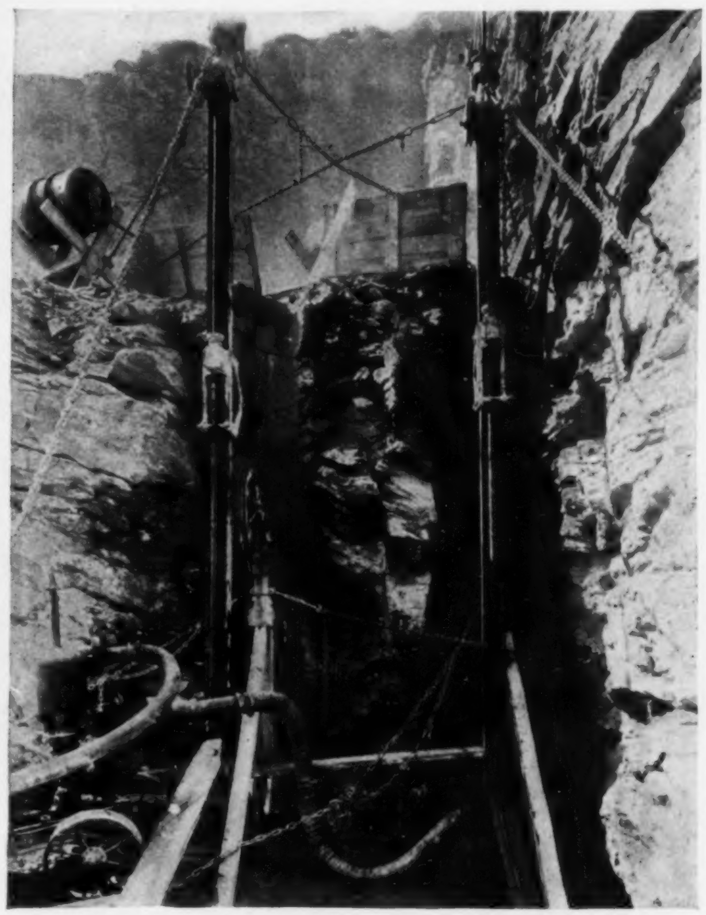
Briefly, the use of the saw involves the following procedure: Calyx drill holes, 36 in. in diameter, are drilled at the ends of the saw cut to a depth about 2 ft. below the proposed bottom of the cutoff trench, chilled steel shot being used as an abrasive for the drill. Structural steel columns, shown in the photographs and drawing, then are set up in the Calyx drill holes. These columns have top or rooster sheaves which carry the cutting wire to or from lower sheaves carried by movable metal frames mounted on the columns. The frame can be moved upward or downward by hand operation of a chain-driven worm gear which actuates a screw extending along the column. Cuts generally are started with a $\frac{1}{4}$-in.

diameter sawing wire consisting of three pre-bent strands of special steel saw wire made by the American Steel & Wire Co. The wire is reeved through the sheaves on the columns and from the columns through hanging sheaves mounted on the columns or on conveniently located guide posts to a motor-driven worm-geared driving jack and to a tension carriage set up at some convenient point on the side of the valley. The ends of the wire are spliced together, the pre-bending of the strands making splicing a simple operation, as the ends of the strands do not have to be tucked. Bottom sheaves on the columns are screwed down to bring the wire in contact with the top of the rock, any space between the wire and the rock being filled with sand or loose earth to prevent sway in the wire and loss of cutting sand. The driving jack then is started, and quartz seashore sand, obtained from Riverside, N. J., is fed into the cut at the point where the wire enters, by means of a small jet of water. The wire passing continuously in one direction carries the sand along, the sand acting as the abrasive, and cuts a slot the width of the wire. As the cut progresses downward, the lower sheaves are screwed down sufficiently to maintain a slight pressure.

Cuts from 30 to 90 ft. in length have been sawed, the rate of sawing varying from about 6 to 20 in. vertically per 24-hr. day, depending upon the hardness of the rock. One saw wire on a cut 30 ft. in length will generally cut from 2 to 8 ft. in depth before breaking, this depth also being dependent upon the hardness. As soon as the wire wears down sufficiently to break, a new wire of smaller diameter is reeved into the sheaves, and the cut is continued until it reaches a depth (from 6 to 8 ft.), which warrants the starting of mucking operations. The trench is then mucked out to the depth of the saw cuts, and new saw cuts are started with the largest size of wire.

CORE DRILL *(left)* sinks 36-in. diameter hole at each end of proposed saw cut. In background are sidewalls of vertical steps in trench cut by wire saws.

Calyx Drill Holes—Present plans contemplate the removal of approximately 3,400 yd. of rock from the cutoff trench, all but about 30 per cent of which will be sawed on both sides to the full depth. For setting up the saw standards it will be necessary to drill approximately 50 Calyx drill holes varying in depth from 12 to 18 ft., depending upon the depth of the cutoff trench. Of these holes, two already have been used as test holes, one of the two being carried to a depth of 57 ft. Two other holes will be used both for setting saw columns and for excavation of a vertical cutoff keyway into one of the vertical rock faces encountered in the excavation. These holes, when completed, will extend to a depth of 52 ft. or more. In addition to those already mentioned, two test holes were drilled which will not be used in connection with the cutoff trench. These holes were carried to an approximate depth of 30 ft. The use of a 36-in. Ingersoll-Rand Calyx drill for putting down the test holes enabled consulting geologists to be lowered into the holes to make a detailed inspection and to obtain data for a concise, accurate drawing showing the location, drift, and strike of all faults and large seams encountered in the rock. Cores obtained by the 36-in. drill are large enough to be truly representative samples of the rock.



TWO PAIRS OF COLUMNS *(right)* for wire saws cutting trench walls on two levels. Note movable sheaves on upper pair of columns which can be screwed down as saw cuts deeper.

Administration — B. L. Crozier is chief engineer of the department of public works, and Leon Small is water engineer. Acting under these men, the writer, as construction engineer, directs operations in the field. George H. Bacot is in charge for the J. A. La Porte Corp.

NEW EQUIPMENT

on the Job

7/16-YD. CONVERTIBLE SHOVEL combines capacity for larger jobs with speed and ease of handling common to smaller machines. Has spring-stop shock absorber which eliminates swing clutch slippage and shock to relative parts at moment of reversing; two-speed gear reduction unit; full length alligator traction units.—Buckeye Traction Ditcher Co., Findlay, Ohio.

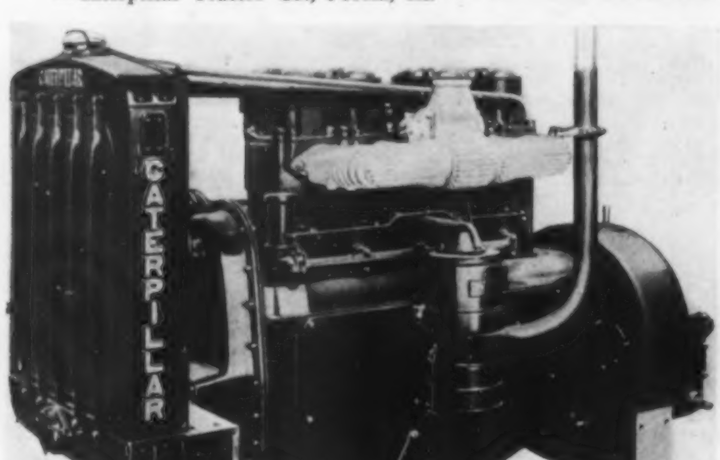
SHOULDER FINISHING MACHINE (1932 Model) *(right)* has mold board couple bar which reverses side thrust action and in combination with direct drawbar pull on outside of frame and weight of machine on solid rubber-tired wheels eliminates side draft, and side thrust when blade is under heavy load.—Moritz-Bennett Corp., Effingham, Ill.

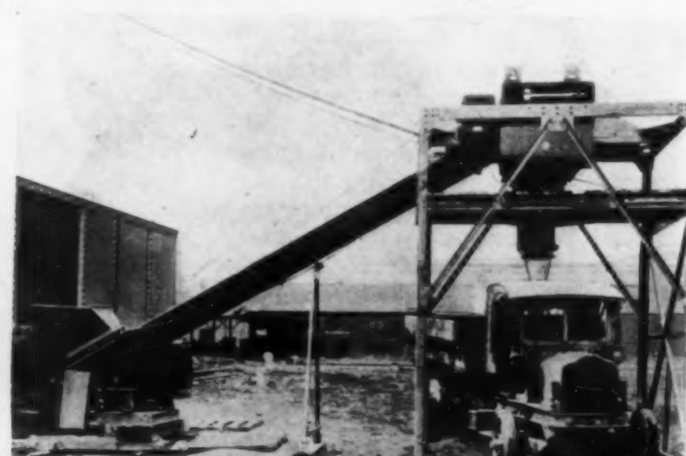
4-CYLINDER TRACTOR ENGINE UNITS *(below)* adapted for stationary and industrial power uses, include one diesel unit 6¼x9¼-in. motor turning at 700 r.p.m., and four gasoline units: 7x8½-in. motor turning at 650 r.p.m., 5½x6½-in. motor turning at 950 r.p.m., 4¾x6½-in. motor turning at 950 r.p.m., and 4x5½-in. motor turning at 1,250 r.p.m. —Caterpillar Tractor Co., Peoria, Ill.

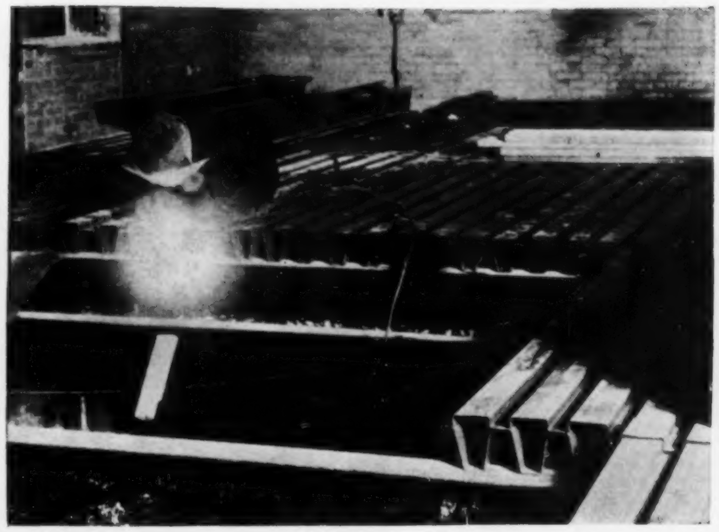
DRAGLINE BUCKET, of double-arched construction (an arch at top and an arch below) assures correct distribution of weight for each class of digging. By simple operation of hitch plate operator sets drag chain for work to be done. New, patented teeth held in place by washer which acts as trunnion. ¼- to 2-yd. capacities.—Wellman Engineering Co., Cleveland.

TILT TRUCK for safe one-man handling of all types of fluids, paints, oils, acids, chemicals, etc., in barrels, carboys and drums. Three models, weighing from 35 to 65 lb. and designed for handling loads from 250 to 850 lb., are made of extra strength steel electrically welded into one solid unit. While loading, pouring or tilting, wheels completely retract, and truck remains in steady position. Positive handle lock assures safe pouring.—Manufactured by Hoist & Crane Engineering Co., New York City. Tidy Products, Inc., Chrysler Bldg., New York City, distributor.

PORTABLE PLANT *(below)* for economical handling of bulk cement has hinged hopper adjustable to car height; a 4-cylinder engine to operate the enclosed screw conveyor and load the 1,000-lb. double beam cement weighing batcher. Springless dial indicators show when batcher is full or empty. No bin needed. Canvas chute controls discharge into truck compartments. — Blaw-Knox Co., Pittsburgh, Pa.







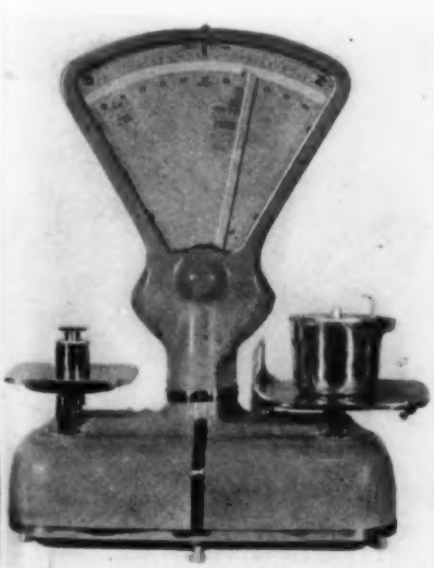
BOTTOM-DUMP TRAILER, equipped with drop-forged track links or wheels, provides low-cost operation under abrasive soil conditions. Has one-piece box-section arch drawbar with an adjustable and reversible, spring-mounted, spring-cushioned, swivel-type tractor hitch. Track assembly has interlocking self-cleaning structure. Body is of $\frac{1}{4}$-in. high carbon steel plate. Four sizes: 5, 6, 7, and 8 yd. mounted on 15-ton "Forged-Trak" wheels.—Athey Truss Wheel Co., 130 N. Wells St., Chicago.

If You Want Further Information—

Within the space limits of these pages it is impossible to present complete information about the products illustrated.

The manufacturers, however, will be glad to supply further details if you will write to them, referring to this issue of *Construction Methods.*

SCALE, *(below)* called "Determination Auto-Gage" for estimating with speed and accuracy, specific gravity, surface moisture and sieve analysis of sand and gravel used in cement batching. Direct readings from scale chart eliminate need of skilled labor. For sieve analysis, scoop with a shoe and scoop weight are furnished.—Toledo Scale Co., Toledo, Ohio.

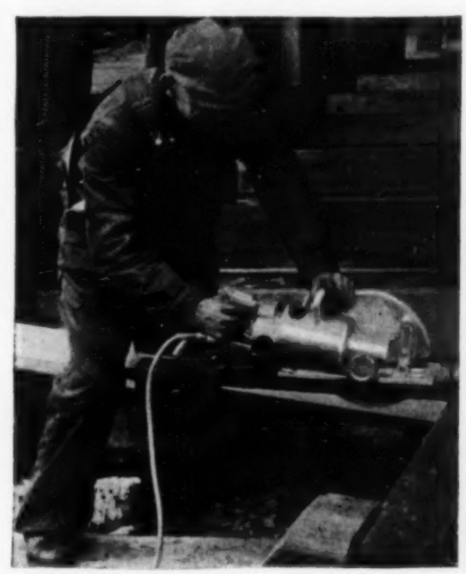


CRANE CAPACITY of "Loadmaster" unit increased to 4,500 lb., making it available as a stationary revolving-boom crane, as a crane traveling with its load, or as a tractor. Available with either Case or McCormick-Deering power and with either wheel or crawler mounting. —Bucyrus-Erie Co., South Milwaukee, Wis.

QUICK-OPENING SAFETY SNATCH-BLOCK *(below)* designed for use of contractors, lumbermen, telegraph and telephone linemen, electric power companies and others who wish a ruggedly constructed snatch block which can be opened quickly for insertion or removal of cables and which is safe when closed. Cheeks of cast-iron. Hook mounted on ball bearings to insure easy rotation and to avoid twisting of cables. Made in sizes from 4-in. to 18-in. sheave diameter with lifting capacities from 3 to 25 tons. —William E. Simpson, 100 Morgan Bldg., Detroit, Mich.

FIREPROOF STEEL FLOOR SLAB of high strength and low weight per square foot is 24 in. wide and up to 12 ft. 5 in. in length. It is fabricated by preforming two steel sheets and welding them together in plane above neutral axis, thus forming four keystone-shaped connected cells, this design providing maximum load-carrying efficiency of metal. This type of floor may be utilized not only as a load-carrying member, but also as a multiple floor-duct system. Slab is laid across structural beams and then bolted, clipped or welded to supporting members, thus eliminating planking and form work.—"Robertson Keystone-Beam" steel floor created by Mellon Institute of Industrial Research and the H. H. Robertson Co., of Pittsburgh, Pa.

ELECTRIC HAND-SAW, measuring 20-in. overall in length powered by $\frac{7}{8}$-hp. Universal motor and equipped with a 9-in. saw blade, will rip 12 ft. of 12-in. lumber in 20 sec., or crosscut 2 ft. of 2-in. lumber in 5 sec. Cutting capacity 3 in. deep. Equipped with tilting base that permits beveling full 2-in. lumber at 45 deg. Saw blade has free speed of 3,600 r.p.m. Weight 24 lb.—Skilsaw, Inc., 3310 Elston Ave., Chicago.



Present and Accounted For—

A Page of Personalities

E. R. DAVIS, recently appointed manager of construction and engineering of Southern California Edison Co., Ltd., has been manager of construction since 1921. Mr. Davis, who has been associated with this company and its predecessors since 1896, acted as general manager of Pacific Light & Power Corp. from 1911 to 1917.

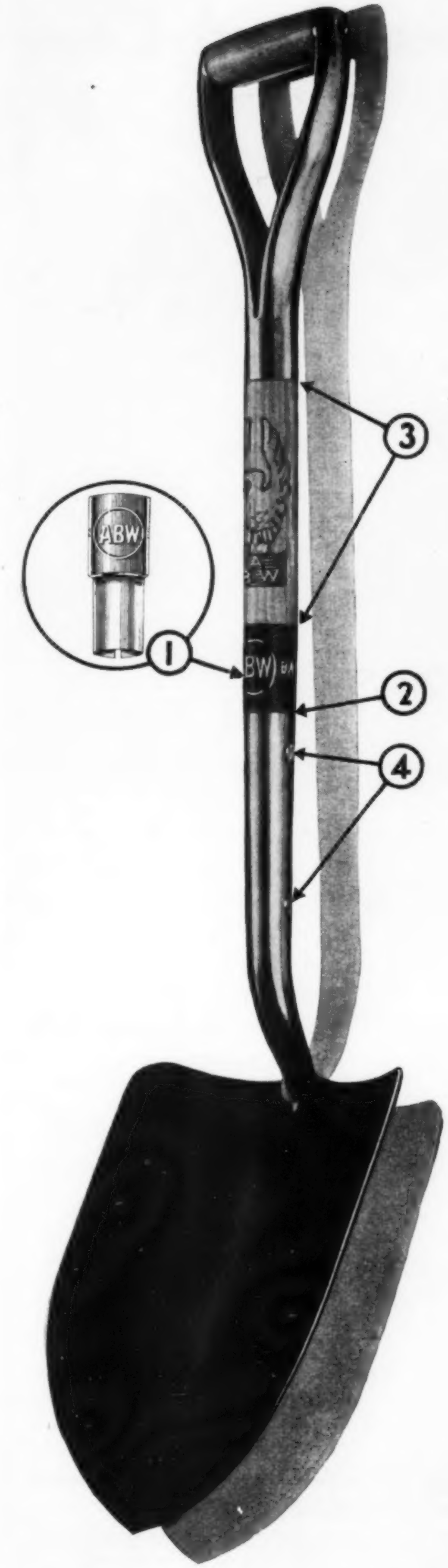
JOHN W. HARRIS *(below)* is first president of newly formed Metropolitan Chapter of Associated General Contractors of America. Chapter includes number of largest building contractors of New York City. Mr. Harris heads Hegeman-Harris Co. as president.

Wide World Photo

R. H. WRIGHT, president of Central Branch of Associated General Contractors of America, Des Moines, Iowa, has appointed committee to investigate desirability of contractors' license law for Iowa. Mr. Wright also is president of Wright Improvement Co., of Des Moines.

O. W. ROSENTHAL, of Chicago, has been elected president of National Association of Building Trades Employers. In his home city, Mr. Rosenthal is president of O. W. Rosenthal-Cornell Co. and of Construction Investment Trust.

GEORGE F. MAITLAND, vice-president of Kansas City Bridge Co., is president for 1932 of Associated General Contractors of Missouri. Varied construction experience qualifies him for capable administration as contractors' chief executive.

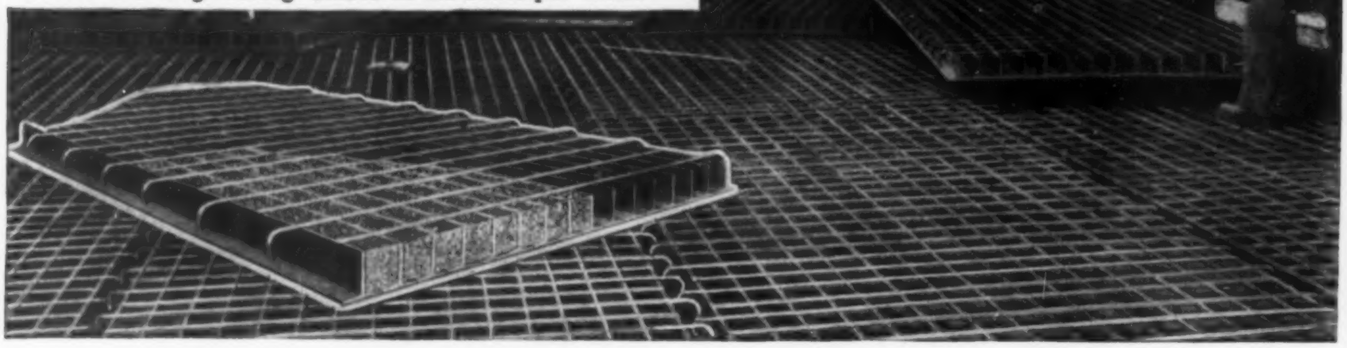

3
ABW
1
2
4

Increased Strength, Decreased Dead Load

TRUSCON
TEEGRID
BRIDGE FLOORS

Simple, rapid erection—greater rigidity—no forms required—quickly opened to traffic—steel armored wearing surface—cross bars pressure welded to tees with no reduction in area—triangular bars hold concrete positively in place—girders, stringers and Teegrid slab become a homogeneous steel diaphram to resist distortion stresses. Write for the Teegrid Handbook.

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO
Sales and Engineering Offices in all Principal Cities

The General's Staff

Each GENERAL EXCAVATOR is designed and built for efficient and dependable service as SHOVEL, CLAMSHELL, DRAGLINE, BACK-HOE, SKIMMER, CRANE or BACKFILLER. It is full revolving and built in one size only. Any **GENERAL** boom assembly may be quickly and easily changed in the field to any other **GENERAL** boom assembly. No changes or additions in the operating machinery are necessary, and changing from one service to another is, at the most, a matter of changing the boom and bucket equipment only.

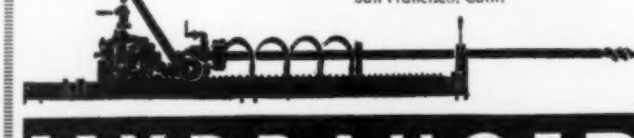
THE GENERAL EXCAVATOR CO.
375 Rose Street Marion, Ohio
U. S. A.

Bore the hole
and save the street

BORE
2½" TO
10½" HOLE

Useless cutting of expensive pavement, loss of time and money are prevented by the use of Hydrauger. This modern method of installing underground piping is saving as much as $60,000 annually in a single city. Straight, open hole is produced, through which piping is easily installed without jacking or damage to pipe or pipe coverings. Catalogue sent on request, without obligation.

HYDRAUGER CORPORATION, LTD.
1298 Bryant Street
San Francisco, Calif.



HYDRAUGER
"The Mechanical Gopher"

RARIN' TO ROLL

HERE'S the "Caterpillar" Sixty-Five Tractor—hitting the dusty, bumpy, sandy, hilly, muddy profit trail for a California contractor. Promptly proving the advantages of its surplus strength and reserve power—quickly revealing how advanced design boosts results.

Owners who know them both declare that this new giant of power and traction will dim the glory of even the stalwart Sixty—that this bigger, huskier brother of the "Caterpillar" line is rarin' to roll up new records for better, quicker, cheaper performance.

Prices—f. o. b. Peoria, Illinois

FIFTEEN	$1100	THIRTY-FIVE	$2400
TWENTY	$1450	FIFTY	$3675
TWENTY-FIVE	$1900	SIXTY-FIVE	$4350
		DIESEL	$6500

CATERPILLAR
REG. U. S. PAT. OFF.
TRACTOR

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.
Track-type Tractors Combines Road Machinery
(There's a "Caterpillar" Dealer Near You)

A LAGGING JOB IS A LOSING JOB

Maximum ease of handling and operating with G-E EQUIPMENT for...

Crushers

TO the **portable** or **semiportable** crusher, for example, electric equipment of General Electric manufacture brings maximum ease of handling and operation. It brings dependability with resultant freedom from costly breakdowns and delays. All this because General Electric has carefully considered the needs of the service from every possible angle, and has designed and built electric equipment exactly *right* for your job.

G-E wound-rotor induction motor, full-voltage starter, and push-button station for convenient control. This is an unusually simple and efficient combination for you if your power is alternating current

Two representative G-E motor and control combinations for contractor's portable crusher service are illustrated here. Both have been designed and built to give you the utmost in equipment value under the rigorous demands of all-year-round crusher duty. Ask about G-E equipment for crusher service—for all power needs. There's coöperation near at hand in a G-E office. If more convenient, address General Electri Company, Industrial Department, Schenectady, N. Y., stating your problem.

Leading contractors have praised the economy and convenience of electrically operated construction equipment. They like its flexibility, compactness, dependability, and its many other advantageous features.

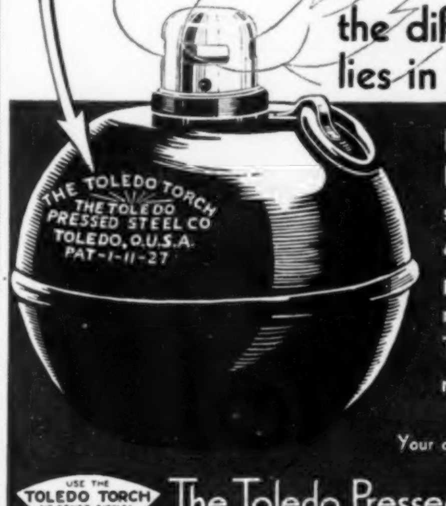
G-E direct-current motor, full-voltage starter, and convenient push-button station. Where the power service is direct current, this combination will fill every need

200-589

GENERAL ELECTRIC

this name on your torches means you have THE BEST

the difference lies in the burner



No other safety light can give you so dependable and economical protection . . . yet real TOLEDO TORCHES cost no more than the rest.

• • •

Your dealer can supply you.

USE THE TOLEDO TORCH NO OTHER SIGNAL MEANS SAFETY

The Toledo Pressed Steel Co.
TOLEDO OHIO

Save with Steel

Save $200

over ordinary mixers on Jaeger's One Bag

SPEED KING

with Accurate Measure Water Tank, Skip Shaker and 100% Roller Bearing. Also in low chargers.

TRAIL IT—ONE MAN LIFTS IT!

DUAL TIRES SPRINGS

Write for catalog, prices, terms.

THE JAEGER MACHINE CO.
800 Dublin Ave. Columbus, Ohio

More PUMP for Your MONEY—$181.00

f. o. b. factory

TIMKEN EQUIPPED

BUYS 2", 10,000 GALLON SELF-PRIME CENTRIFUGAL

Portable, one-man, 100% automatic priming pump, complete with 2-2½ h.p., 4-cycle engine and strainer also electric power. Send for latest catalog, prices on all sizes and types of Jaeger Contractors Pumps.

ALSO MIXERS—HOISTS—TOWERS

The JAEGER MACHINE COMPANY
800 Dublin Avenue
Columbus, Ohio

70%

more actual operating hours from

Ebonite XL BRAKE LINING

Read this letter from Michael Pontarelli, well known Chicago contractor.

MICHAEL PONTARELLI
General Contractor
Sewer and Water Pipe—Bridges and Docks
CHICAGO, ILL.

L. J. Miley Company, Inc.
1462 S. Michigan Avenue, Chicago

Gentlemen:

In answer to your request for my opinion of your product (Ebonite XL) that has been installed in two of my Northwest No. 7 Pullshovels:

I have found that your lining is giving approximately 70% more actual hours of operation than the lining with which these machines were previously equipped. I also find that your lining (Ebonite XL) does not cut or score the brake drums as did the lining that preceded it.

I have also found your service to be prompt and courteous and assure you that it has been a pleasure to have your co-operation and assistance in making the above test.

Sincerely yours,
MICHAEL PONTARELLI

Make this Test . . .

If you want 70% more working hours, to stop drum scoring—write us the make and model of your shovel and we will ship the Ebonite on "Memo Bill". If it doesn't prove the best lining you ever had, send it back.

L. J. MILEY COMPANY
INCORPORATED
1462 S. Michigan Avenue, - Chicago, U.S.A.

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or RESALE

UNDISPLAYED—RATE PER WORD

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications 10 cents a word, minimum charge $2.00.

Proposals, 50 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch	$6.00
2 to 3 inches	5.75 an inch
4 to 7 inches	5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL 10 A. M. THE 27TH OF THE MONTH FOR THE ISSUE OUT THE FOLLOWING MONTH C.M.

"REACH THE MAN WHO WANTS ONE"

If you have good used serviceable equipment for sale, suitable for the civil engineering and construction field, you can reach the man who wants it through the

SEARCHLIGHT SECTION

Searchlight advertisements are quick acting. They bring prompt returns. There is no better way to reach the men of the civil engineering and construction field at small cost.

ALPHABETICAL INDEX TO ADVERTISERS

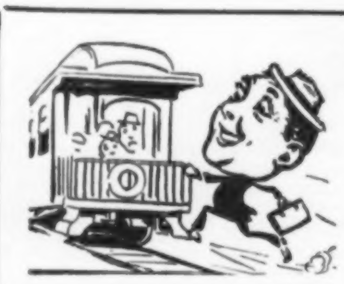
This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Construction Methods* assumes no responsibility for errors or omissions.

	Page
American Steel & Wire Co.	4th Cover
Ames Baldwin Wyoming Shovel Co.	45
Associated Manufacturers of Multi-Wall Sewn Paper Bags	4
Austin-Western Rd. Mchry. Co.	2nd Cover
Bucyrus-Erie Co.	13
Carnegie Steel Co.	44
Caterpillar Tractor Co.	47
Cities Service Company	3
General Electric Co.	48
General Excavator Co.	46
Hazard Wire Rope Co.	43
Hydrauger Corp., Ltd.	46
International Cement Corp.	6-7
Jaeger Machine Co.	49
Kalman Steel Corp.	12
Link Belt Company	8-9
Martin-Decker Corp.	50
McGraw-Hill Co.	50
Miley Company, Inc., L. J.	49
Northwest Engineering Co.	5
Roebling's Sons Co., John A.	10-11
Searchlight Section	51
Shell Eastern Petroleum Products, Inc.	3rd Cover
Thew Shovel Co.	14
Toledo Pressed Steel Co.	49
Truscon Steel Co.	46-50

▼ ▼ ▼

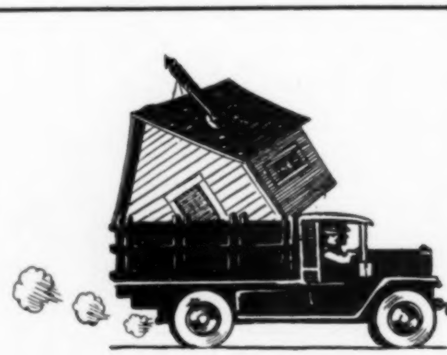
SEARCHLIGHT SECTION
Classified Advertising

Classifications	Page
USED AND SURPLUS EQUIPMENT	
Foster Co., L. B.	51
Hyman-Michaels Co.	51
Osgood Co., The	51
Wemlinger, Inc.	51



No Matter—

Why you move
Where you move or
How you move



Please change my mailing address—

Make sure *Construction Methods* follows wherever you go.

And then, no matter where you move to all that *Construction Methods* needs is your old and new address.

If you have a new job in view, fill in the coupon and *Construction Methods* will be there to aid you with timely tips and helpful hints. Whenever you move be sure to

USE THE COUPON

CONSTRUCTION METHODS,
330 W. 42d St., New York City, N. Y.
I have moved FROM

Name ....

Street ....

City .... State..............

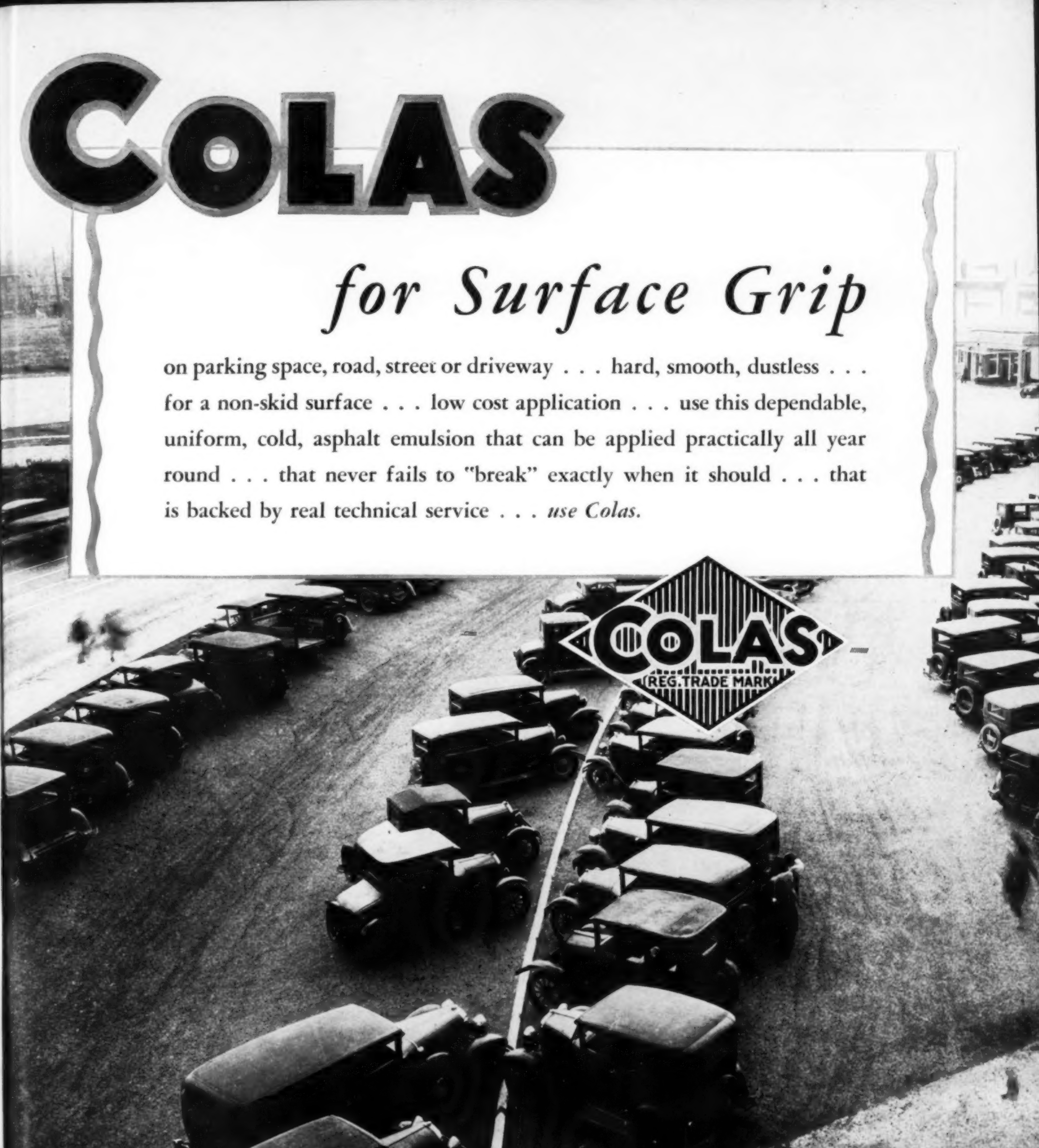
TO

Street ....

City .... State..............

Company Employed by
or Business Connection ....

Nature of Business .... Title..............


COLAS
for Surface Grip
on parking space, road, street or driveway . . . hard, smooth, dustless . . . for a non-skid surface . . . low cost application . . . use this dependable, uniform, cold, asphalt emulsion that can be applied practically all year round . . . that never fails to "break" exactly when it should . . . that is backed by real technical service . . . use Colas.
COLAS REG. TRADE MARK
SHELL OIL COMPANY • San Francisco
SHELL PETROLEUM CORPORATION • St. Louis
SHELL EASTERN PETROLEUM PRODUCTS, INC. • New York City
Licensees of Colas Roads, Inc., New York City